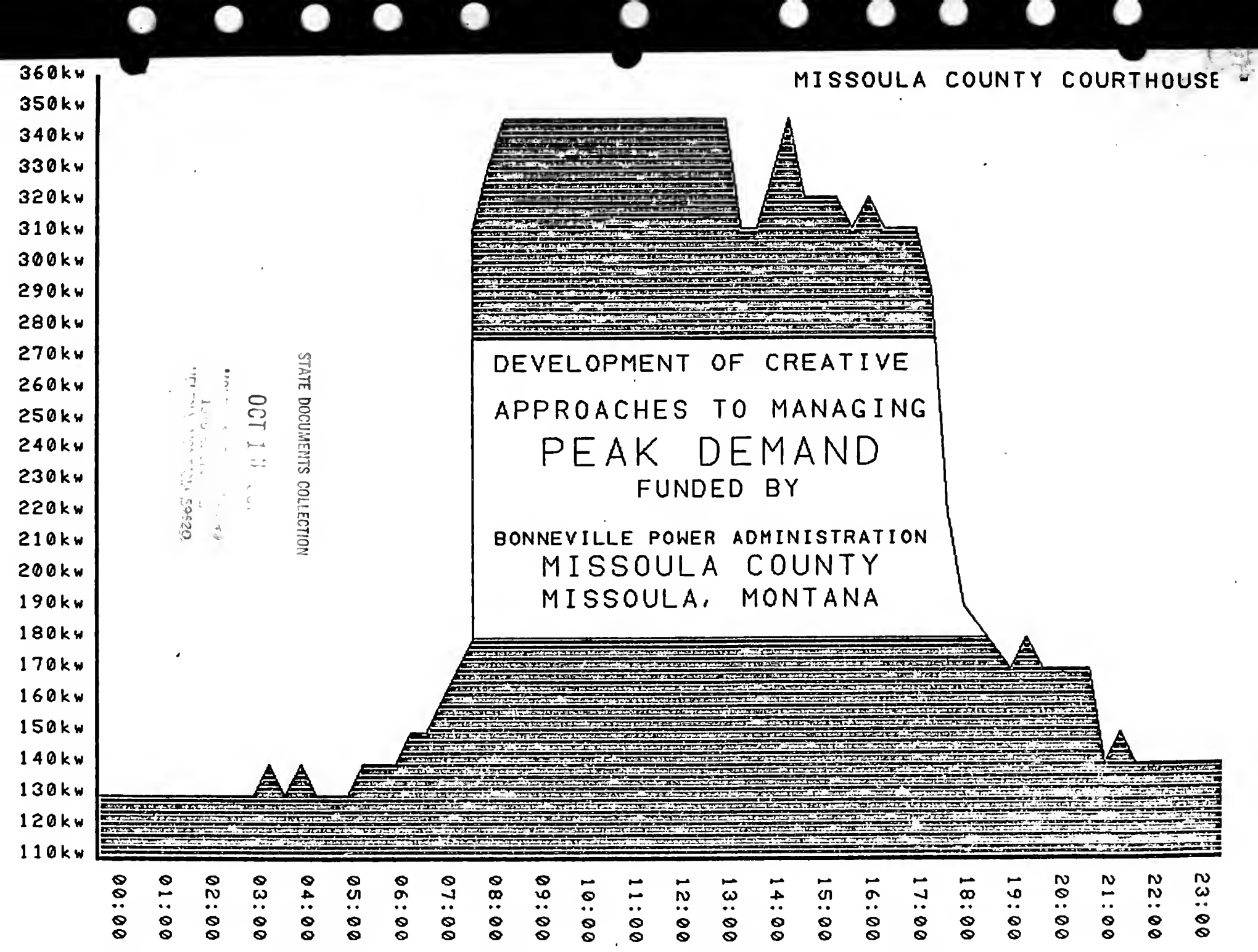
Development of creative approaches to managing peak demand



DEVELOPMENT OF CREATIVE APPROACHES TO MANAGING PEAK DEMAND

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GRANTEE

Missoula County
Missoula, Montana

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TABLE OF CONTENTS

Introduction

In October of 1985 Missoula County received a grant from the Bonneville Power Administration entitled "Development of Creative Approaches to the Control and/or Reduction of Peak Load Periods". The primary focus of this project was to evolve into second generational issues relative to the management of energy consumption in governmental buildings. Specifically the project addressed the issue of exploring the feasibility of controlling and/or reducing peak demand periods and assessing the cost associated with the consumption of energy by local units of government. The project involved the use of the Missoula County environment as a research and development laboratory for looking at creative ways to modify existing energy use patterns which affect peak load times. This included not only mechanical and lighting systems but also the impact on the delivery of governmental services and their realtionship to peak load times.

The project included an assessment of all mechanical systems, prioritization methodologies for the classification of essential and non-essential uses of both equipment and delivery of services, the development of policy directives for managing peak demand periods, development of contingency policies for reducing consumption during peak demand periods, the establishment of maximum acceptable peak loads and its relationship to delivery of county services, an education component to obtain program acceptance, an evaluation component to measure effectiveness, and the development of an implementation manual. The project took into account the interrelationship of energy use patterns to both the quality and quantity of services. The project concept used a practical approach in that all identified solutions have been field tested and evaluated as to their effectiveness. In effect, this manual documents the practical approach used in this local governmental environment including the identification of all ideas tested, barriers encountered, and results obtained.

In order to enhance the readers understanding of the scope of the project and the environment where the study was conducted, the following sections describe the scope of work delineated in the grant proposal as well as the quarterly progress reports submitted to the funding agency. The balance of the report describes

the methods applied, results attained, and the barriers encountered in the implementation of the project.

Background

Missoula County is a general purpose unit of government located in west central Montana. Missoula County has a jurisdictional area of 2,612 square miles and a 1982 population base of 75,165. It is the home of the University of Montana and the headquarters of the Northern Region of the U.S. Forest Service. Along with these identified organizations, the wood products industry, transportation and retail trade are the mainstays of the local economy.

During the past five years, Missoula County has suffered from a declining tax base which has had a drastic impact on available revenues to support local services. Given the geographic size and population base of Missoula County, the demand for local services is great. Also, given the fact that the wood products industry is the major contributor to the local economic base, the economy has been drastically impacted by the recession which has further reduced the available resources to support County governmental services. This reliance on a service oriented economic base along with a relative no-growth population base, has resulted in a constant revenue stream which has not kept pace with inflationary factors. In effect, the result has been a no-growth budget which must be funded through scarce resources and which must respond to the ever increasing pressure for local governmental services.

This local economic situation, together with a declining federal revenue picture, has resulted in Missoula County's attempt to explore creative solutions to resolve local issues. A primary concern of Missoula County has been the development of creative ways to deal with both the management of energy consumption within the County maintained facilities and controlling utility costs. Missoula County's concern for energy consumption in County maintained facilities has its basis on its impact relative to the overall operational budget. The impact of energy consumption has been drastic since the County currently maintains in excess of 250,000 square feet of governmental office space as well as averaging 7700 heating degree days during the heating season.

During the past ten years, Missoula County has taken progressive steps to deal with the issue of energy consumption. In 1976 Missoula County began to hold

regular meetings with representatives of various segments of the community to discuss energy planning. These discussions eventually led to the formation of an energy consevation board through an interlocal agreement in 1980. In 1982 Missoula County created and hired an Energy Conservation Coordinator. Also during this time frame Missoula County made several significant modifications to existing facilities to conserve and control energy consumption. These modifications included:

*Installation of storm windows

*Installation of additional insulation

*Sealing of the building envelope

*Modifications to the existing heating and cooling plant

*Installation of a heat pump system in the Old Courthouse

*Computerized inventory of all mechanical systems

*Computerized maintenance schedules for the preventive maintenance program

*Installation of an energy management system

*In-house training of maintenance staff

These activities resulted in reducing further options to control energy consumption to high cost capital investments with long term pay-backs. When consideration is given to the initial capital cost, favorable cost benefit ratios do not result; particularly when consideration is given to the anticipated pay-back period. Therefore, energy consumption and cost control have been reduced to policy issues relative to the question of how energy is currently used and the exploration of changes in current use which would result in savings over the long term.

Missoula County considers the above described historical activities to be of a first generational nature. In effect, all possibilities have been explored and implemented to the point that further capital investment is not considered to be cost effective. This project involved the development and implementation of the next evolution of this process which is to move towards second generational solutions

to resolving energy issues. In effect, Missoula County implemented the process of exploring policy issues which directly relate to assessing current use factors for possible changes in these patterns which will result in reduced energy consumption and cost containment.

The installation of the energy management system, which is fully described in the next section, provides Missoula County with the capability of fully documenting its energy use patterns. This system was developed in-house, since research indicated that standard systems would not meet Missoula County needs.

Missoula County is typical of most units of government in that it has a variety of structures to maintain in terms of architectural styles, mechanical systems and age. For the purposes of this project, the following two facilities were selected for research and demonstration:

*Missoula County Courthouse-Built in 1906, has historical designation, square footage-37,500

*Missoula County Courthouse Annex-Built in 1965, office space and jail facilities, square footage-50,000

Energy Management System

This mixture of architectural styles and types of mechanical systems lended itself to designing a specific system for this environment with all software developed and controlled in-house. In effect, this decision to design and install the energy management system has given Missoula County the ability to take into consideration the unique features of each facility.

Currently this system controls and monitors all systems in the two selected facilities. It also has a design feature which provides complete monitoring of energy consumption on fifteen minute intervals each twenty-four hour period. The system provides for extensive monitoring of 1) mechanical systems, and 2) space temperature control. Also the discrete operation of equipment in terms of start-up, shut-down and night settings, have been implemented. The system provides for the implementation of load shedding and the monitoring and adjustment of peak load. The analog function has been developed to automate the dampers and all valves for steam and chilled water.

The main system consists of a PDP 11/24 minicomputer as the host processer. This computer is used to tie all the buildings together to one common point for central monitoring. The majority of the monitoring work is done by programmable controllers, e.g. industrial microprocessing, capable of handling analog/digital(A/D) or digital/analog(D/A) input/output I/O signals. These processors are capable of operating even if the host system fails, therefore no air conditioning equipment in the buildings need to be on manual if this should occur. The final terminal equipment of the programmable controller (PC's) is in the form of discrete I/O modules, analog modules and further down the line resisstance temperature detectors (R&D's) for temperature sensing.

The system not only has the capabilities of saving utility cost through controlling energy consumption but also has the function for monitoring equipment for failures, run time, and many other unusual conditions. Because continued monitoring is in place, various studies on the buildings can be implemented to determine further ways to optimize the performance of the mechanical and building envelope systems. These capabilities can not only control energy consumption but also can reduce the number of manhours needed to chech equipment on a daily basis to see if it is operating correctly. This provides more time for the maintenance staff to perform planned preventive maintenance duties on equipment.

The following sections describe how each of these components work and how they tie into each other to form the entire control monitoring system.

Host Computer

The Host system is a Digial Equipment Corporation PDP 11/24 with direct RLO2 Megabyte drives and an RSX 11M operating system. The communications hosts to the PC's are a DZ11A eight line asynchronous multiplexer. The connections are VIA EIA RS 232 connectors.

The DZ11A's have the features of duplex communications and are software programmable baud rates.

The features of the host system are as follows:

*Up to 4 megabytes of memory can be installed

*User friendly command language interpreters are supplied with the system (MCR and DCL)

*Fortran language for application programs

*Macro assembly language

*Flexible librarian routine for ease of programming-these libraries can be created by the user. By using libraries for routines that are often accessed by the calling programs the programmer only has to specify the library switch during linking time for object modules or assembly time for MACRO libraries.

*Command file routine processing provides for ease of access to the files

*Interrupt driver system allows the users to enter a command and have it immediately processed without waiting to be polled

*Multitasking system so that more than one task can be running at a time

*Priority scheduling of tasks-task with higher priority will gain control of the processor before lower priority tasks. Tasks with the same level of priority are scheduled via round robin scheduling

*Memory partitions can be set up-tasks that are used all the time can be fixed in the memory without being rolled out. The partitions can also be used for inter-tasks communications

*Spawnable routines can be utilized

Fortran language is used because the RSX 11M operating system supports it very well. Also Fortran is fairly easy to program the type of routines that are needed for the MCCCS as well as running fairly fast and efficient on the PDP 11/24. The Macro assembly language routines are written for the routines that are used for communicating to the programmable controller and routines that are more efficient in assembly code than Fortran, e.g. Hexidecimal to decimal conversions and decimal to hexidecimal conversions.

Programmable Controller (PC's)

The programmable controller for the system could have been almost any type and almost any type could be added at a later date. However, the system currently uses the Texas Instruments PM 550's. These controllers have the following features:

*16 bit processors

*7KW of memory(14K bytes of user memory)

*Computer interface modules

*512 descrete I/O

*64 analoge I/O (these are multiplexed to accomodate the many temperature points needed)

*Floating point math

*Special functions are as follows:

*Entry Point

*Binary to BCD

*Scale

*Unscale

*Square

*Square Root

*Compare

*Math

*Sequential Data Table

*Correlated Data Table

*ASC II String

*Sequential Shift Registers

*Fall Through Shift Registers Input

*Fall Through Shift Registers Output

*I/O Move

*Two processors are utilized in the PM 550; one for scanning the ladder logic (9514) and an executive processor (9900).

*Two I/O Ports

*Ladder Logic Programming

*Programming Through a Video Processing Unit

The PM 550's were choosen because their cost was lower than the Allen Bradley and Modicom units of comparable equipment. Also the PM 550's have the feature of floating point math and other functions that lends itself better for the process control function.

Thermometers

The thermometers are of R&D (resistive temperature detector) type and are manufactured by Nationwide Electronics Systems. The reason for R&D over thermocouple type is the immunity over noise if the probes are hundreds of feet away from the thermometer itself. The thermometers have the following features:

*Level length compensation-this allows for more than one probe to be multiplexed to the thermometer and the length of the wire is taken into consideration for the measurements

*Analoge to BCD conversions

*Switchable from fahrenheit to celsius measurements

*Four digit resolution

*Range is from -50 to 310 degrees C

Scope of Work

As was pointed out in the introduction, Missoula County is typical of the majority of local units of government in terms of 1) variety of structures maintained 2) variety of mechanical systems involved, and 3) limited resources available to respond to the increasing demand for services. Also, most units of government are in the position of completing low cost/no cost options and are presently coping with cost benefit ratios in terms of capital investments. These first generational

activities have responded in large measure to the issue of cost containment relative to reducing or controlling consumption cost. However, they have not responded to a primary cost factor facing these commercial users, namely peak demand. This project presented a second generational program to address squarely the issue of energy management in terms of responding directly to the issue of peak demand cost. This project treated energy as a resource required to perform local governmental services and as a resource it must be managed wisely if costs are to be controlled. As such it has implications in terms of impact on other services in relationship to quantity and quality.

The first nine months of the project were used to generate data on peak demand loads experienced by Missoula County and the development of strategies to reduce and manage this impact of energy use. The scope of work involved the following major activities:

*Exploration of the feasibility of duty cycling. This incudes identification of negative impacts on equipment as well as an assessment of its impact on peak demand.

*Identification of non-essential and essential use equipment. This involves the classification of equipment and energy use in order to identify non-essential uses. This activity would lead to policy directives relative to responding to peak demand situations.

*Exploration of current temperature settings. This involves assessing the impact of temperature settings on overall energy consumption and its relationship to comfort levels and employee productivity and morale.

*Exploration of lighting systems and its impact on peak demand. This involves assessing current lighting levels in relationship to standards for public buildings and work stations.

*Identification of educational issues. This involves assessing the potential impact of changes in energy use patterns on county employees, and the development of an appropriate educational program to effectively implement the changes.

These activities were accomplished through the achievemnet of the following objectives:

Objective #1 To explore the feasibility of duty cycling mechanical equipment during peak demand periods.

Task 1.1 Inventory and identification of equipment eligible for duty cycling.

Task 1.2 Review of equipment specifications to determine any negative impacts to duty cycling.

Task 1.3 Identification of impacts to related equipment or systems to determine feasibility.

Task 1.4 Impementation of duty cycling on appropriate equipment.

Task 1.5 Through the use of computer modeling, document the impact of duty cycling on peak load.

Objective #2 To idendify essential and non-essential equipment/systems as well as use patterns for implementation during peak demand periods.

Task 2.1 Inventory of all equipment and systems as to use and functions.

Task 2.2 Development of a prioritization methodology for rating the equipment/systems as to relationship to overall functions.

Task 2.3 Rank all equipment/systems through the use of the methodolgy developed under task 2.2.

Task 2.4 Assessment of implementation impacts to functions and services.

Task 2.5 Implementation of a pilot period to test impact on peak load as well as function and service.

Task 2.6 Based on pilot results, develop implementation policies.

Task 2.7 Identification of all County Services and functions.

Task 2.8 Development of a prioritization methodology for rating of county services and functions.

Task 2.9 Rank all county services and functions through the use of the methodology developed under task 2.8 into essential and non-essential classifications.

Task 2.10 Develop contingency policy directives for implementation during periods of peak demand and submit to governing board for adoption.

Objective #3 To assess the impacts of temperature settings on peak load periods and comfort levels.

Task 3.1 Inventory of all auxiliary systems used by employees to supplement the central heating and cooling system.

Task 3.2 Assess the energy consumption levels of auxiliary systems in relationship to peak demand periods.

Task 3.3 Pilot test temperature settings in relationship to the elimination of auxiliary systems, establishment of comfort levels,and impact on peak demand.

Task 3.4 Develop policy directives in relationship to the use of auxiliary systems and submit to governing board for adoption.

Task 3.5 Develop policy directives on minimum and maximum temperature settings and submit to governing board for adoption.

Objective #4 To assess the impact of lighting systems on peak demand periods.

Task 4.1 Inventory of all lighting systems in county maintained facilities.

Task 4.2 Metering of all lighting systems to determine footcandles produced in relationship to standards for public occupancy and work stations.

Task 4.3 Explore alternative lighting changes through the installation of energy savers and task lighting.

Task 4.4 Through the use of computer modeling technics, assess the impact of implemented lighting changes on peak demand.

Task 4.5 Through the use of surveying technics, assess the impact to affected workers and impact on productivity.

Objective #5 To assess the cost factors for each 10kw increment of peak demand and establish maximum peak demand increment acceptable for county operations.

Task 5.1 Through the use of computer monitoring, document current peak demand use by the county in 10kw increments.

Task 5.2 Develop cost calculations for each 10kw of peak demand use.

Task 5.3 Through the use of computer modeling, assess impact on county operations for each 10kw of peak demand reduction.

Task 5.4 Present the information gathered under task 5.3 to the governing board to obtain policy directive on maximum acceptable peak demand use.

Task 5.5 During a three month pilot period, implement all recommendations developed under objective #1 through #4.

Task 5.6 Assess the results of the pilot period on maximum acceptable peak demand levels and impact on county operations.

Task 5.7 Adjust recommendations and policies where appropriate.

Objective #6 To develop an energy education program in order to develop understanding of the problem and acceptance of implemented changes.

Task 6.1 Develop a county employees energy committee composed of representatives from various county departments.

Task 6.2 Develop an education program to establish an understanding of energy consumption patterns on overall county expenditures.

Task 6.3 Review all research and draft recommendations with the county employees energy committee to gain input and recommendations for modifications.

Task 6.4 Through the Missoula County energy committee, implement an overall County employees education program to develop an understanding of energy consumption patterns and support for the project.

Quarterly Progress Reports

(Please note that the exhibits cited in the quarterly reports are located in the appendixes)

First Quarterly Report

Objective #1 Feasibility of duty cycling.

Task 1.1 Inventory-All major mechanical equipment has completed, (copy enclosed as exhibit A)

Task 1.2 Staff is currently in the process of reviewing all equipment specifications in order to determine any negative impacts which might occur to the equipment if duty cycling were implemented. This approach is being used in order to ensure that no equipment damage will be experienced when duty cycling is operational. This review will be completed during the second quarter of the project.

Task 1.3 This task will be completed during the second quarter of the project.

Objective #2 Identify essential and non-essential equipment/systems. (copy enclosed as exhibit A)

Task 2.1 The inventory of all equipment has been completed and is attached to this report. This inventory includes not only major mechanical equipment but also, all office equipment as will as all non-essential equipment.

Task 2.2 The prioritization methodology is in the process of development. After the energy audit of the equipment a few things became quite apparent. 1) There is an unusually high load of what may be considered non-essential equipment eg coffee pots, space heaters, etc.. If all or even 80% of this equipment was eliminated we could easily achieve a 15% to 20% reduction of our electrical load or approximately 75,000KWH. Due to the fact that this equipment is connected to outlets at random we are unable to create a computer model which will achieve load shedding for this type of equipment. 2) However there will be additional major equipment eg office equipment, which may be eligible for the load shedding model, but that possibility is currently being researched.

The draft prioritization methodology is as follows:

Priority A. Essential

1. The building cannot function without the equipment.
2. One office or area's operation is seriously hampered by the equipment's inoperable state.
3. The county is mandated by law to operate the equipment at this rate, or schedule.

Priority B.

1. The machines operating could be adjusted to operate at a different schedule other than normal working hours.

2. The machine or equipment could be adjusted to operate less than its present rate, eg candidate for duty cycling or load shedding with no or little impact on its operation or other equipment or other space.

Priority C. Non-essential

1. This category includes items such as coffee pots, space heaters, pop machines etc..

Where some of the equipment falls into the B category due to influencing factors such as cold spots in the building, unreasonable sterile environments etc., it would be reconsidered. Since such a large load is being created by what is considered non-essential equipment, it will have to be addressed through the policy component of the work program.

Task 2.3 This will be completed during the second quarter after the methodology is finalized.

Task 2.7, 2.8, 2.9 Will be compleled during the second quarter of the project.

Objective #3 Assess impacts of Temperature settings.

Task 3.1 The inventory of all auxilary systems has been completed and as referenced above attached to this report.

Task 3.2 The assessment of consumption levels is completed for all equipment. Exhibit A referenced above not only includes the assessment by equipment type and location but also idenfities the consumption level of each office within the courthouse complex. Exhibit B to this report provides an energy consumption profile of the courthouse complex for the years 1984 and 1985. Please note that this includes not only dollar cost and consumption levels but also provides an assessement of the peak demand loads for the same period..

Objective #4 Assess Impact of Lighting Systems

Task 4.1 The lighting system inventory for the courthouse complex has been completed and is attached as Exhibit C to this report.

Task 4.2 All the lighting fixtures in the courthouse complex have been metered and is attached to

this report as Exhibit C. This report also identifies the consumption level of all the fixtures within the complex.

Task 4.3 We are currently exploring alternates to the current lighting utilization pattern.

Task 4.4 The computer modeling has been completed and a sample report is attached as Exhibit D. This report identifies lighting as a major contributor to the peak demand situation currently experienced by the courthouse complex. In reviewing the information contained in Exhibit D, The following assumptions should be considered:

1) All lighting full on, takes up 120 KW.
2) All heating equipment added to the base load adds 50 KW.
3) The base load is 100-120 KW.

In reveiwing this information we are assuming that all heating equipment is operating at peak efficiency. Therefore we are currently exploring the composition of this base load. To date we have accounted for 50% of the base through an analysis of the usage patterns. This 50% of base appears to be attributed to the Jail operation, the 9-1-1 communications center, and the operation of the main computer system. In effect we are searching for the cause of the remaining 50% base load.

Objective #5 Assess Cost Factors of Peak Demand.

Task 5.1 The computer monitoring of the consumption levels is completed and attached to this report as Exhibit E. This will be an ongoing function throughout the life of the project. The monitoring cycles on a twenty-four hour period and then generates a report. This data is analyzed on a weekly basis.

Task 5.2 The cost calculations of the peak load and energy comsumptions levels are displayed on Exhibit E of this report. This program identifies the highest peak for a 24 hour period, the time it occurred, the highest peak of the month, total kwh usage during the last 24 hour period, and the total kwh usage during the month.

Objective #6 Energy Education

Task 6.1 The employee committee has been implemented. This committee is composed of the following county departments:

Accounting

Appraisal
Attorneys
Central Stores
Clerk of Court
Commissioners
Data Processing
District Court
Justice Court
Motor Vehicles
Personnel
Recording
Sheriff
Surveyor
Treasurer
Youth Court
One member at large

At the first meeting of the committee the purpose of the project was explained. The members were requested to go back to their respective departments to discuss and document any problems the employees see with the operation of the existing system. The reason for this approach is to begin the process of having the employees understand, 1) the operation of the system, 2) understand in economic terms the ramifications of proposed changes, and 3) provide an oportunity for input into how the energy consumption of the county is managed. The project staff is currently in the process of reviewing the submissions by the departments in order to address the issues raised at the next meeting. This will be an ongoing function during the course of the project.

Summary.

One of the primary problems in terms of gaining support for the project is the issue of appropriate temperature settings throughout the complex. During the life of the courthouse annex, many remodelling projects have occurred. This has caused both cold spots and hot spots within the structure, because the floor plan no longer follows the as built specifications. Therefore, the annex system must be rebalanced in order to achieve some level of uniformity with the heating and cooling system. This rebalancing of the system will occur during February and March, 1986. When this is completed, we will be in a position to address the policy issues relative to temperature settings.

The first quarter of the project has by and large involved researching the various aspects of the system, as well as completing the computer programmming

involved with the project. Since this is now completed with the exception of a few minor adjustments, the balance of the tasks should be on target.

Second Quarterly Report

Ojective #1 Feasibility of duty cycling.

Task 1.1 Inventory-All mechanical equipment has been completed and modified from the first quarterly report and is attached as exhibit A.

Task 1.2 Review of Equipment Specifications and Task 1.3 Identification of impact, is presented below:

1. Annex Basement Chiller
Type: Trane
Model #: CGWA-1006-MA
Ratings: 33.2 full amp 208 volts 7580 watts
Duty Cycle: No
Explanation: Must be in full operation when needed. The basement has no outside air venting into the space.

2. Air Handling Unit #2
Type: G.E. Tri Clad
Model#: 5K 184 AG201
Ratings: 208-220V 2.5/5 Amp 3 phase 4200 watts
Duty Cycle: Yes
Explanation: This unit can be duty cycled with the other air handling units.

3. Main Blower #2
Type: GE Tri Clad
Model#: 5k 4254A21
Ratings: 7.5hp 208-220V 3 phase 20.6A 840 watts
Duty Cycle: Yes
Explanation: Same as number 2

4. Rollotron Air Filter #2
Type: Model D
Model#: 765223
Ratings: Cap 9380 Size 7-60 110 Volts 3.4 amps 60 watts
Duty Cycle: Yes
Explanation: Same as number 2

5. Air Handling Unit #3
Type: G.E. triclad
Model#: See AH1 #1 (same) 3520 watts
Ratings: "
Duty Cycle: Yes
Explanation: same as above

6. Main Blower #3

Type: G.E. Tri Clad
Model#: See Blower #2 850 watts
Ratings: 5hp 14.2/7.1 amps
Duty Cycle: Yes
Explanation: same as above

7. Rollotron air filter #3
Type: Model D
Model#: 765223
Ratings: see R.A.F. #2
Duty Cycle: Yes
Explanation: same as above

8. Air Handling Unit #1
Main Fan
Type: Toshiba
Model#: B0104F2UD
Ratings: 230 Volts 26.8/13.4 Amps 10hp 1900 watts
Duty Cycle: Yes
Explanation: same as above

9. Return Fan #1
Type: G.E. Tri Clad
Model#: 5K 215 AG 201
Ratings: 5hp 208-240V 7.1/14.2 Amps 5hp 1140 watts
Duty Cycle: yes
Explanation: same as above

10. Rollotron Air Filter
Type: Model D
Model#: see R.A.F. #2,#3
Ratings: same
Duty Cycle: Yes
Explanation: same as above

11. Boiler Feed Pump
Type: Century
Model#: 8-119665-01
Ratings: 1/3 hp 230 Volts 2.6 Amps 800 Watts
Duty Cycle: No
Explanation: Cannot be duty cyled, must operate with temp request.

12. Basement Heaters
Type: American Air Filter
Model#: F-79-00930
Ratings: 208 Volts 4 steps 60,000 full load watts, 15000 w/step
Duty Cycle: yes
Explanation: These heaters are used less frequently all the time. It is possible to put a control switch on the units which will keep them off during peak times.

13. 9-1-1 Air Conditioning
Type: Trane
Model#: KWVA-0303-0C
Ratings: 12.1 full load amps/208volt/11830 watts
Duty Cycle: No
Explanation: The 9-1-1 Center is isolated from the rest of the building. The air conditioning is absolutely necessary at all times.

14. 9-1-1 Center
Type: Radio and Communications Equipment
Model#: Various
Ratings: 6000 watts
Duty Cycle: No
Explanation: The 9-1-1 Center is a 24 hour emergency operations and communications system for the County.

15. Air Conditioning for Mainframe Computer
Type: Trane
Model#: KWDA-0753-0C
Ratings: 25.1 full load amps 208volts 11,830 watts
Duty Cycle: No
Explanation: The Mainframe must be keep within temperature parameters it insure its performance within manufactors specifications.

16. Mainframe Computer
Type: Burroughs
Model#: Various
Ratings: 10,520 watts
Duty Cycle: No
Explanation: The Mainframe is in operation 24hours per day. Any disruption in power source will effect the quality of the output.

17. Elevators #1 & 2
Type: Otil
Model#: N/A
Ratings: 7500 W and 7700 W Resp
Duty Cycle: No
Explanation: Elevator #1 is for jail/prisoner transport. Elevator #2 is the public elevator and must operate by law to accomodate handicap access.

18. Elevator #3
Type: Montgomery
Model#: N/A
Ratings: 3000 W
Duty Cycle: No
Explanation: The public access elevator is the only access for the handicapped.

19. Jail Fan
Type: Toshiba

Model#: 80034 DGF 2A4
Ratings: 230V 8.2 A 3HP 3800 Watts
Duty Cycle: No
Explanation: The air circulation units in the Jail must operate in accordance with Jail condition specifications.

20. Jail Exhaust Fans (4)
Type: Carnes
Model#: BE3-24A
Ratings: 1/4 hp 120V 4.2 Amp 130 watts each
Duty Cycle: NO
Explanation: Same as #19.

21. Jail Kitchen Exhaust Fan
Type: Carnes
Model#: BE 3-27B
Ratings: 208V 1/2hp 2.1 amp 350 watt
Duty Cycle: No
Explanation: Must be in operation at all times to be in compliance with fire codes.

22. Jail Air Circulation Unit
Type: Leeson Motor
Model#: C6T-17FB-2A
Ratings: 1hp 5.4 amps 208V 660 Watts
Duty Cycle: No
Explanation: Constitutional standards reguire a certain number of air changes per hour.

23. Heat Pumps (40)
Type: American Air Filter
Model#: SSACW 19230
Ratings: 208V, 12full load amps 2400 watts
Duty Cycle: No
Explanation: see number 24

24. Heat Pumps (22)
Type: American Air Filter
Model#: SSACW-19230
Ratings: 208V 18full load amp 3600 watts
Duty Cycle: No
Explanation: The heat pumps operate on a dead band/temperature request basis. Operation occurs from 68-72 degree and 78-82 degrees. A computer copy of operating times will be included in the next quarterly report. The computer copy will indicate times of operation of the heat pumps at various times of the year. This will indicate our cycling times of all the units.

Notes: The air handling units size are being increased. The installation of the larger fans and units as well as the total rebalancing of the system

will be completed by June 1 and reported on in the next report.

Task 1.4 Implementation of Duty Cycling

A duty cycling test was run for two weeks with the old air handling units from April 7-18. Another test will duty cycle the new air handling units upon completion of installation. The results of these two tests will be included in the next report.

The duty cycling test will cycle all three air handling units from 8-5 on a 40 minute on, 20 minute off basis. Another test will duty cycle the air from 8-10 and then again from 12-2pm. An air quality test will be performed for both test periods to determine if any serious air quality problems arise from either situation. The cycling schedule for the air handling units is provided in exhibit B.

Task 1.5 Computer Modeling

Will be included in the third quarterly report.

Objective #2 Identify essential and non-essential equipment/systems

Task 2.1 Inventory completed and is attached as exhibit C.

Task 2.2 Prioritization Methodology- All equipment has been given a number for the ranking as follows: (Also see exhibit D)

1. Office equipment-Priority A
2. Mechanical equipment-Priority A&B
3. Lighting-Priority B
4. Space Heaters-Priority-C
5. Coffee Pots-Priority-C
6. Misc. Equipment-Priority-C

In 2.2 we rated the equipment according to its priority of use for County operations. 2.3 attempts to take our information one step further by breaking down the categories within the priorities.

Priority A-Contains office equipment necessary for effective county operations and basic operating equipment necessary to keep the building in a livable state. This equipment also includes the Jail, 9-1-1, Mainframe and its chiller.

Priority B- Is that equipment which is available for duty cycling or down watting or delamping for lighting.

Priority C- Equipment is all the space heaters, coffee pots and misc. equipment in the building. Misc. equipment covers radios, pop machines, clocks, refrigrators, air cleaners, etc. It is recognized that a certain percentage of these items are necessary in any office complex, however it is a policy determination relative to what percentage of the overall load will be allocated to non-essential priority C equipment. Another policy issue which will have to be addressed involves the distribution of power as the load increases in terms of priority A and B equipment should the county commensuratly decrease priority C equipment use to offset the increase. Missoula County's use does differ somewhat from the national ranking of building energy consumption characteristics of commercial buildings. This information is presented below:

National ranking

1. Heating and Ventilating
2. Lighting
3. Cooling and Ventilation
4. Equipment and Processes
5. Domestic Hot Water

Missoula County ranking

1. Lighting
2. Equipment and Processes
3. Heating and Ventilation
4. Cooling and Ventilation
5. Domestic Hot water and Cooling Water

Establishing a ranking and rating system for equipment provides an opportunity to seperate the conservation goals into three distinct categaries. Priority A equipment must be dealt with in terms of appliance efficiency. This equipment must have an analysis of their operating efficiency built into their purchase specifications. Priority A equipment is also the main equipment addressed in our operations and maintenance program. In effect, efficiency is the central issue with priority A equipment.

Priority B equipment offers the opportunity to address options such as duty cycling and its effects on (the equipment) over time. We also investigated any equipment which might be short cycling. Lighting is also in this category with options such as down-watting, and testing lighting devices such as

reflectors and watt savers. Lighting re-design is also a way to address reducing the amount of light wattage in a cost effective way.

Priority C equipment deals with replacement, reduction and elimination. One option we are exploring is the replacement of the space heaters with newer lower wattage energy saver types of space heaters. Space heaters are also creating a fire hazard in the buildings. A policy is being developed to either eliminate all space heaters or reduce the number currently in use. Other equipment such as coffee pots and misc. equipment is a matter of the type of work environment the county will provide to its workers. At some point in the project we will have to address the discrepancy between personal comfort and energy conservation.

Task 2.4 Assessment of Implementation Impact. When we begin to address the impacts of the ranking/rating system, a few things became apparent. The lower the priority of the equipment the more noticable eg (to the employees) the conservation method becomes. Priority C methods require a change of work style or habits and generate the most criticism. To address this problem we have approached all three priorities with equal attention. Priority B methods are somewhat noticable by most of the employees if the implementation is done with their co-operation. Priority A improvements such as appliance efficiency and increasing the quality of our maintenance plan goes virtually unnoticed.

Task 2.5 Implement Pilot. See pilot test March 28 Scenario #3 see exhibit D.

Task 2.6 Develop Policies. Based on the pilot test to reduce or as closely as possible eliminate non-essential equipment, a policy banning personal space heaters is being proposed. The county will provide 12 radiant 200W space heaters to alleviate the problem of cold pockets and poor circulation. Based on a serious problem of poor air circulation the Annex is being rebalanced. This should eliminate the need for the majority of the space heaters currently in use. The 12 replacement heaters should adequately accomodate the current problem. The following standards are being used for the rebalancing project:

Air ventilation Standards-1985 UBC 605-608: Ventilation Systems Chapter 6. Requirement for Group A Occupancies-A mechanically operated ventilation system shall be capable of supplying a minimum of 5 cubic feet/minute of outside air with a total circulated of not less than 15 cubic feet/min/occupant in all

portions of the building during such time as the building is occupied. If the velocity of the air at the register exceeds 10/feet/second the register shall be placed more than 8 feet above the ground of the floor directly beneath.

A temperature policy will also assist with the space heater problem. The temperature policy will set the temperatures from 68-72 for heating and 78-82 degrees for summer cooling. The temperature policy is being developed from the identified savings listed to "Tracking Energy-energy Record Keeping and Energy Systems M.E.A.". The percentage of savings possible due to temperature reduction is as follows:

7000 H.D.D. with 75 degrees F as a reference point.

74 degrees 2.89% 72 degrees 8.67% 70 degrees 14.45% 68 degrees 20.23% 65 degrees 28.89% 60 degrees 43.34%

Task 2.9 Rank all County Services- This process will be completed by the end of the third quarter. One of the problems has been identified that the majority of offices housed in the Missoula Courthouse complex are legally required services. The Montana Code Annotated requires that all of these offices are to be openned eight hours per day five days per week. The Courthouse houses the Fourth Judicial District, County Attorney's Office, Personnel, and the County Surveyor. The Annex houses the 9-1-1 Emergency Dispatch Center, Sheriffs Office, Jail, Justice of the Peace Courts, Commissioners, Clerk and Recorder, Assessor, Treasurer and support functions of Data Processing, Accounting, and Materials Management. In order to develop policies arround either the closure, reducted hours of operation or flex time, we have requested a County Attorney's opinion regarding the interpetion of the statute delineating the hours of public access to these offices. It has become apparent that some functions within these offices could be limited with respect to hours of operaton, therefore we are also accessing the impact this would have on the basic functions of the offices. The premise of this task is to access the feasibility of restructuring the hours of operation arround the times we currently experience peak loads. However, the basic problem revolves arround statutory requirements which might lead to legislative changes to provide County's in Montana with the flexibility to manage hours of operation.

Task 2.10 Develop Contingency Policies. This task will be completed during the Third Quarter.

Objective #3 Access Impacts of Temperature Settings

Task 3.1 Contained in Audit Report see exhibit C

Task 3.2 Assess Energy Consumption Levels- See exhibit D Entitled Energy Pilot Test Scenarios.

Task 3.3 Pilot Test Temperature Settings- See exhibit D.

Objective #4 Assess Impact of Lighting Systems.

4.1 Inventory all Lighting Systems-Included in First Quarterly Report.

4.2 Meter all Lighting Systems- Metering on blueprints is not completed. All lighting levels and variations will be completed for third quarterly report.

4.3 Explore Alternatives- Third quarterly report.

4.4 Computer Modeling- Third quarterly report.

Objective #5 Assess Cost Factors of Peak Demand.

Task 5.1 Implement Computer Monitoring-examples provided in exhibit D.

Task 5.2 Develop Cost Calculations- Cost calculations of 10k increments are winter-46.69 peak demand charge and summer 29.17 peak demand charge. see exhibit E. Because it is uncertain at this time whether or not we will reduce the overall KWH in the building or whether we will be redistributing it, the KWH charge reduction is not included. Therefore, at this time only KW cost reductions are addressed.

Task 5.3 Implement Computer Modeling-On-going.

Objective #6 Energy Education

Task 6.1 Develop Employee Committee-Completed

Task 6.2 Develop Education Program-On-going

Task 6.3 Committee Review-The next meeting of the employee committee will be on May 14. At that time all proposed policies will be presented to the committee.

Task 6.4 Implement Education Program-The committee has functioned so will that it is proposed at this time to

be an ongoing permanent committee of the County. Its primary purpose is to provide a forum for employees and management to address energy conservation and related maintenance concern.

Third Quarterly Report

Objective #1. Feasibility of duty cycling.

Task 1.1- Completed
Task 1.2- Completed
Task 1.3- Completed
Task 1.4- Implementation of Duty Cycling

Duty cycling was implemented during the last quarter in the courthouse annex. However problems relative to comfort levels were experienced during this test period. The basis of the problems had to do with the occupancy load of the building. This complex houses high volume offices in terms of citizens seeking county services. These services are in the areas of Treasurer, Driver Exam, Motor Vehicles, Assessors, Clerk and Recorder, Justice Court, and the Sheriff Office. During the afternoons when the offices reached a peak occupancy level, discomfort of the occupants became accute from the lack of fresh air. The complaints developed during the time the air handling units were off. Because of this problem we are postponing further testing of duty cycling until the annex is rebalanced. This phase of the project involves the installation of defuseres and higher horse power motors. This will give us the capability to control the air flow to the work areas and increase the volume of fresh air coming into the building. Once this is completed we will implement the duty cycling in the annex. Currently, the first floor is completed and the second and third floors are in the process of being completed. This phase will be done by mid-August.

The old Courthouse mechanical system consist's of 60 heat pumps. We are currently running monitoring of the operation of these heat pumps to determine the necessity of duty cycling. Attached to this report you will find Exhibit I, which reflects a typical 24 hour period of operation.

Task 1.5- Completed

Objective #2. Identify Essential and Non-essential Equipment/Systems.

Task 2.1- Completed
Task 2.2- Completed
Task 2.3- Completed
Task 2.4- Completed
Task 2.5- Completed
Task 2.6- Develop Policies

Two policies were developed and submitted to the Commissioners during the period. (See Exhibit II) The policies had to do with temperature settings and space heaters which were both rejected by the Commissioners. The rationale for the rejection had to do with the "hassle factor" in terms of anticipated complaints if the policies were implemented. Another key element involved in the rejection had to do with cost benefit. Missoula County during the past five years has implemented the majority of what can be termed low cost/no cost energy conservation measures. These measures involved not only moving towards the operation of the equipment at peak efficiency but also involved what can best be called weatheration measures to the structures. Therefore, the Commissioners wanted the policies to be measured in economic terms relative to their effectiveness. The bottom line became the comparison of the cost savings in relationship to the "hassle factor". The Commissioners have agreed to review the policies again once the lighting project and rebalancing project are completed. This should occur in September.

Task 2.7- Completed
Task 2.8- Completed
Task 2.9- Completed
Task 2.10- Develop Contingency Policies

This phase of the project is in the process of being completed and will be fully reported on in the fourth quarter of the project.

Ojective #3. Assess Impacts of Temperature Settings.

Task 3.1- Completed
Task 3.2- Completed
Task 3.3- Completed
Task 3.4- Pilot Test Temperature Settings.

This task has been placed on hold by the Commissioners until the rebalancing project is completed.

Task 3.5- See Task 3.4.

Ojective #4. Assess Impact of Lighting Systems.

Task 4.1- Completed
Task 4.2- Completed
Task 4.3- Explore Alternatives

We are currently in the process of implementation of various alternatives to the existing lighting system. This will be completed in the fourth quarter and fully reported on in the final report.

Task 4.4- Computer Modeling.

The modeling phase relative to the impact of the existing lighting system has been completed. Once the alternatives are installed computer monitoring will be implemented to assess the relative impact of the alternatives.

Objective #5. Assess Cost Factors of Peak Demand.

Task 5.1- Completed
Task 5.2- Completed
Task 5.3- Completed
Task 5.4- Three Month Pilot Period

This will be implemented during the Fourth Quarter.

Objective #6. Energy Education

Task 6.1- Completed
Task 6.2- Completed
Task 6.3- Committee Review

All draft policies are reviewed by the committee prior to submission to the Commissioners.

Task 6.4- Contineous

Also inclosed as exhibit III is the updated energy consumption file.

Implementation Process

The implementation process involved the following three elements; 1) data collection, 2) experimentation, 3) identification of results and 4) identification of barriers. These elements are discussed in detail below:

Data Collection

This process involved the collection of information relative to the energy consumption of the Courthouse Complex as well as a complete assessment of all equipment which consume energy. The energy management system was installed in 1983 and has the ability of monitoring peak demand on fifteen minute intervals. Examples of the type of reports which are generated by this system are found in the appendixes. This information together with the an analysis of the energy bills, also found in the appendixes, formed the foundation of the information relative to both current consumption patterns as well as cost. The second component of the data element involved the complete inventorying of all components of the mechanical system, office equipment, lighting systems, and miscellaneous equipment such as coffee pots, radios, space heaters etc.. During this process an attempt was made to ensure that all mechancial equipment was operating at peak efficiency. This process was conducted by both internal maintenance personnel as well as the use of outside mechanical engineers. The rationale for this was to ensure that either equipment failure or equipment inefficiency was not a contributing factor to the issue of peak demand.

This analysis revealed several issues which are discussed below:

1) The system generated graphs reflected that the complex had a base load of approximately 110kw. It also documented that during the night the complex would level off at the base line and would begin to rise at about 7:00am and continue to rise to a peak average of approximately 320kw by 9:00am. This peak would remain constant until approximately 4:00pm when it would begin to fall dramically and level off to the base by 10:00pm.

2) An assessment of the base load was also conducted during this time to ensure that the reasons for the base load was a necessity. This assessment revealed that the base load was caused by the jail facility, 9-1-1 dispatch center, data processing, and the Sheriffs Department which are 24 hour 7 days per week operatons.

3) The inventory of all equipment revealed that there was a significant amount of what can best be described as creature comforts throughout the complex. This inventory included such items as coffee pots, space heaters, radios etc.. Because of the volume of these items thoughout the complex, an assessment was also conducted relative

to the consumption levels of these items as well as the consumption levels of each office in the complex.

4) The data collection effort also included a complete inventory of all lighting systems in the complex and the relative consumption levels of these systems. This also included an assessment of foot candles produced to determine if not enough, meets standards, or too much was found in the complex.

This information was then analyzed to determine the contributing factors to peak demand as well as the cost implications of continuing with the current use patterns. This analysis indicated that the major contributing factors to the peak demand load was the lighting system and the miscellaneous equipment in use in the complex. It was also determined that the following cost savings could be realized with reductions in peak demand:

a) 140kw reduction would result in an annual savings of $5,421.00

b) 100kw reduction would result in an annual savings of $4,170.00

c) 80kw reduction would result in an annual savings of $3,335.00

d) 60kw reduction would result in an annual savings of $2,662.00

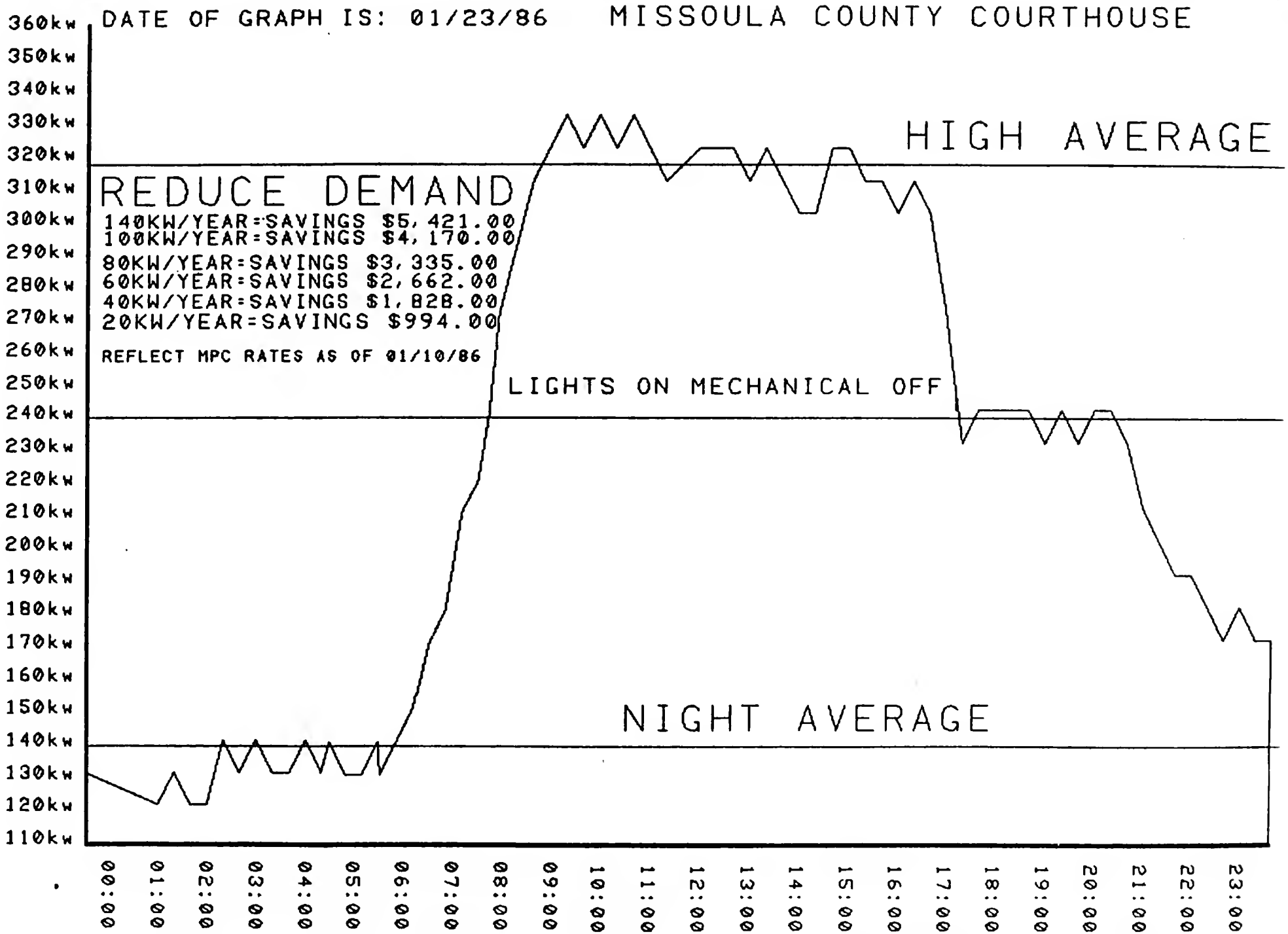
e) 40kw reduction would result in an annual savings of $1,828.00

f) 20kw reduction would result in an annual savings of $994.00

The following graph dated 01/23/86 provides the information relative to the times and amount of the base load, impact of the lighting system on peak demand and the average experienced. Once this information was collected and analyzed the experimentation process was implemented.

Experimentation Process

The experimentation process involved looking at the issues of duty cycling, changes in the lighting system, and impact of miscellaneous equipment on the system.


DATE OF GRAPH IS: 01/23/86
MISSOULA COUNTY COURTHOUSE
360kw
350kw
340kw
330kw
320kw
310kw
300kw
290kw
280kw
270kw
260kw
250kw
240kw
230kw
220kw
210kw
200kw
190kw
180kw
170kw
160kw
150kw
140kw
130kw
120kw
110kw
HIGH AVERAGE
REDUCE DEMAND
140KW/YEAR=SAVINGS $5,421.00
100KW/YEAR=SAVINGS $4,170.00
80KW/YEAR=SAVINGS $3,335.00
60KW/YEAR=SAVINGS $2,662.00
40KW/YEAR=SAVINGS $1,828.00
20KW/YEAR=SAVINGS $994.00
REFLECT MPC RATES AS OF 01/10/86
LIGHTS ON MECHANICAL OFF
NIGHT AVERAGE
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
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22:00
23:00

Before the experimentation process was begun two other components of the project were implemented. These two components involved the development of a method to classify equipment and services into essential and non-essential functions, and the establishment of the Employee Energy Committee. The specifics of the classification process is located under the quarterly report section. However, there is one significant aspect of this process to note. The classification of equipment proved to be no problem, however, the classification of services into essential and non-essential proved to be difficult. The Montana Code Annotated specifically require that all legally mandated services be open 8-5, five days per week, except for legally identified holidays. An assessment of the services located in the complex indicated that the majority of the services are either legally manidated or support services. The Employee Energy Committee was initiated prior to the experimentation phase in order to begin the education process as well as gaining their input. This involved both a review of the data collection elements with the committee as well as a complete review of the types of experiments which would be conducted and the expected results. This also involved a survey of the employee attitudes relative to the current operation of the system. This survey indicated a dissatisfaction with existing air temperatures to the need for more air movement within the complex. Specifics of the above process is presented below:

1) Duty Cycling: The air handling units located in the courthouse annex were selected for duty cycling. The duty cycling schedule called for the air handling units to cycle either on a 40 minute schedule or 20 minute schedule depending on the location of the units. The initial experimentation occurred over a period of 20 working days. During this time many compliants were generated from the offices which occupy the space in question. These compliants ranged from being either too cold or hot, to a general feeling that the quality of the air had deteriorated during the time in question. In order to determine the legitimacy of these compliants the energy management system was utilized to monitor air temperature in the various zones and the State Air Quality Bureau was contacted to measure the quality of the air. This monitoring revealed that both the comfort zone and air quality had deteriorated during this time to unacceptable levels.

This structure was build in 1965 and during that time many remodeling projects had occurred which resulted in the zones being divided to the point that if the present system was not kept in full operation both the

temperature level and air quality would suffer. This situation was further compounded through the fact that high traffic offices occupied the space in question. The high traffic levels involved the public seeking services and at peak times exceeds the occupancy rating of the space. In order to deal with this problem a rebalancing project was undertaken. This involved the purchase of higher horse power fan motors in order to be able to move higher volumes of air and the purchase of defusers to replace the T-bar ceiling grid system. It was felt that this would not only enable the movement of higher volumes of air but would also allow for the placement of air where it was needed and put the building under positive pressure. Duty cycling in this area has been placed on hold until the project is completed. At this time two floors are complete and the third floor is in the process of installation. The length of time required to complete this project has been extended because of the need to use in-house maintenance personnel to keep the cost down.

The Old Courthouse which is heated and cooled through a heat pump system was also considered for duty cycling. However, before this was implemented detailed monitoring of the system was conducted to determine if effective results would be obtained. The system operates on a dead ban zone with an energy saving cycle which means that the units are off unless there is a call for heating and cooling. In effect the heat zone is in the range of 68-72 degrees which means that the units are off until the temperature drops to 68 degrees and then the units heat until the 72 degree temperature is achieved. The data analysis of this system demonstrated that though the use of dead ban zones, duty cycling by a different method had been effectively achieved. Therefore no experimentation with duty cycling was conducted with the heat pump system.

2) Lighting System: As was indicated in the data collection element, the existing lighting system was found to be a major contributing factor to peak demand. In order to control this component of the system research and experimentation was conducted through the use of. light reflectors, energy savers, and down wattage as well as giving consideration to task lighting. Each of these options were assessed from both an initial cost perspective, potential impact on the peak demand load, as well as impact on productivity in each of the affected offices. Because of the volume of lighting systems involved it was determined that the most cost effective approach was to down watt the lighting system. The reflector system was ruled out because of the initial cost involved which was approximately $200 per fixture. The energy savers

tested appeared to have a negative impact on the ballast as well as not showing any measurable impact on consumption. Therefore all fixtures in the complex are being changed out to 35watt cool white fluorescent tubes. Currently 80% of the complex has been changed out. Missoula County also has the capability to computerize the lighting system throughout the complex. This automation will allow the complete control of lighting levels as well as the insurance that all lights are off after hours.

3) Miscellaneous Equipment: As was stated earlier, miscellaneous equipment is comprised of coffee pots, space heaters, radio's, etc., and through the priority ranking process was rated as the least important to county functions. In order to confirm the impact of the miscellaneous equipment on the peak load, a complete inventory was conducted relative to the location, type, and load of the equipment in question. This inventory is located in the appendixes. The confirmation of this was verified through an experiment conducted on March 28, 1986. During this period, all departments were requested not to use coffee pots and space heaters during the day. The results of this experiment are located in the appendixes. This experiment process also did a comparison between all systems running in relationship to the March 28, 1986 test. The results of this comparison demonstrated that space heaters and coffee pots contributed approximately 90kw to the overall load or an annual cost of approximately $4,000.00.

The major problem with the miscellaneous equipment is the inability to automate this use in order to control consumption at peak times. This is due to the varity equipment served by an outlet. The only control mechanism which can result in reductions to the contribution to peak loads is through policy directives from the Board of County Commissioners. The results of this experimentation process were reviewed by the Employee Energy Committee and the Board of County Commissioners.

Identification of Results

The project resulted in the following positive benefits to Missoula County:

1) Prior to the initiation of the project Missoula County had little information relative to the nature of peak demands on total energy cost as well as the nature

and type of equipment in use which contributes both to peak demand and total energy consumption. The data collection element provided detailed information on both total energy consumption as well as the type and quantities of equipment through out the complex. A side benefit of this data collection process involved the detailed assessment of the current operation of the mechanical equipment. Assumptions had been made in the past that all equipment was operating at peak efficiency and that compliants were the results of personal preference rather than founded in fact. An example of this was the discovery of the inadequate air flows in the courthouse annex. Through time the system had been disrupted by various remodeling projects as well as overall increases in occupancy loads. This data collecting together with the experimentation process documented a real problem which had to be corrected if both energy conservation and increases in comfort levels were to occur. The major benefit of the data collection element was the generation of the information necessary to make management decisions relative to use. In effect, the information is now available to actually manage the energy consumption of the county. Basically the county now has both the information available and the management capability to assess the impact on energy consumption of various management options being considered.

2) The experimentation process provided an environment to test new ideas to attempt to reduce peak demands. This allowed for maximum creativity in the process to both test the impact of ideas on peak demand as well as the impact on comfort levels and productivity. A side benefit of this process was the discovery of inadequacies in the current system which contributed to peak loads. This process also allowed for the involvement of the Employee Energy Committee through allowing for that group to also generate ideas and to share with them the results. This process also documented the current status of the system and provided information relative to which direction to go in terms of either modifications to the system or purchase of different types of equipment. As was stated earlier this process identified that miscellaneous equipment and the lighting systems were directly the cause of the peak loads being experienced.

3) Employee education became a key component of the project. The Employee Energy Council proved to be very benefitical in terms of both educating the employees on current patterns of consumption as well as making them part of the process in determining solutions to the problem. One of the things which became apparent was the lack of understanding relative to the real cost of

energy consumption to the county. Also the employees became educated relative to how the system actually operates. When the process begin the majority of employees felt the system was similiar in nature to their homes in terms of being able to implement immediate changes. An example of this type of attitude was apparent with the inadequacies of the system in the courthouse annex. The general feeling was that if it was two hot or cold all one had to due was either turn the heat/cooling up or down. There was no consideration to the fact that the system must be balanced as well as under positive presure in order to reduce the number of cold or hot pockets in the complex. This committee and process will continue beyond the time frame of this project.

4) The identification of the miscellaneous equipment proved to be a very positive benefit to the county. Prior to this being done, the assumption was that peaks were caused by the nature of the consumption levels of the major mechanical systems. No one had consider the impact of either the lighting system or the volume of small equipment located throughout the complex. The determination that this small equipment contributed approximately 90kw to the overall load came as a complete surprise. This determination also focused on the need to implement policy directives if the peak demand was going to be managed.

5) The implementation of various changes in the system and management of peak demand during the project period has resulted in a reduction of peak loads by approximately 20kw. Although this reduction is small it has resulted directly through the assessment of the current system operation as well as making small changes in the operation. This has involved improving the overall operation of the system in terms of efficiency as well as the relamping of the complex and is not a result of any major changes.

In summary the results of the project has been positive it terms of enhancing the understanding of all components of the system as well as providing detailed information relative to the impacts of various management decisions as well as changes in the operation of the system. Missoula County now has all the information and capability to implement any changes desired by the policy makers of the county.

Barriers to Implementation

The major barriers to implementation decisions fell in the area of policy decisions. During the second quarter of the project two policies were presented to the Commissioners for implementation. One policy had to do with the reduction in the number and type of space heaters available to individual offices and the second policy had to do with the establishment of maximum and mininum temperature levels. The Commissioners rejected both policies for the following reasons:

1) The Commissioners felt that the resulting dollar savings to the county did not achieve the desired benefit in relationship to the "hassle factor". Hassle factor is being used in terms of the level of anticipated compliants which would result from the occupants of the building if "personal comfort" items were band or reduced, as well as the level of compliants resulting from manditory temperature settings.

2) The Employees Energy Committee also shared these same concerns with the Commissioners. The employees also felt that there would be a resulting reduction in productivity if these policies were implemented.

3) In terms of managing energy consumption during peak loads, the Commissioners felt that nothing should be implemented which would reduce full service to the tax payers of the county. They felt that anytime a tax payer comes to the county they should expect and receive full service. Therefore no experimentation in the reduction of service levels during peak times was allowed during the project period. Basically the Commissioners felt that all systems should be fully operational during the business day.

In order to overcome these barriers, changes are being made in the start-up times for the major mechanical systems. It is hoped that these changes will result in both a reduction in the level of compliants as well as a reduction in the number of space heaters in use in the complex. In the past, start-up has occurred approximately 30 minutes prior to building occupancy. The new change involves having start-up occur one hour before occupancy tuesday through friday and one hour and a half on mondays. It is felt that if the complex can achieve temperature by occupancy it will preclude the need on the part of employees to use space heaters. This change also involves the alarming of all zones in the complex so that failures in the system can be determined prior to the receipt of a compliant.

Once the rebalancing component is complete and the above referenced changes fully implemented, the policies on space heaters and temperature settings will be re-introduced to the Commissioners for consideration.

Summary

The real benefit of this type of project is the collection of historical data, the process of experimentation with new ideas, and the verification that all systems are operating at peak efficiency. This enhances all parties knowledge of the system as well as workable options available to manage energy consumption. Once this is in place the ability to implement changes at what is determined to be the appropriate time can be done with ease. However it must be kept in mind that change in energy use patterns come slowly and the effort must be continued over time in order to have the ability to respond to energy use when it can be demonstrated that substancial savings will result.

APPENDIX I

EXHIBITS REFERENCED IN THE FIRST QUARTERLY REPORT

EXHIBIT A

TOTAL WATTS OF MISCELLANEOUS INVENTORY BY DEPARTMENT

NEW SIDE

BASEMENT

Central Stores	2810
Printing	3560
Microfilm	4045
General Services	399
Maintenance Managers	260
Conference Room	1,060
D.E.S.	1450
Records Management	210
Data Processing	2409
911	3,235
ALL HALLWAYS	2,300

1ST FLOOR

Sandwich Shop	600
Drivers	462
Motor Vehicles	7535
Assessor	10,524
Treasurer	4187
Switchboard	1290

2ND FLOOR

Commissioners	9032
Elections	1886
Clerk and Recorder	3570
Auditor	1766
Employee Lunchroom	900
Smoking Lunchroom	200
Accounting	5,566

3rd FLOOR

Sheriff	11,221
Hallway	2,950
Justice Court	4,077
Small Room	2,500
JAIL	(11,714)

OLD COURTHOUSE

1ST FLOOR

Personnel	4725
Surveyor	9803
Youth Court	4220

2ND FLOOR

Attorneys	5,522
Courtrooms (2)	10,060

3RD FLOOR

Judge Greene	3,050
Clerk of Court	7905
Judges Harkin/Wheelis	1457
Judge Henson	2531
Large Courtroom	4,500
Major Equipment	85,435

MISCELLANEOUS EQUIPMENT INVENTORY

DESCRIPTION	NO.	HP/WATTS	TOTAL WATTS	U.F.	ADJ. WATTS
Commissioners					
Beehive Computers	3	55	165	1.0	165
Typewriters	5	100	500	3.8	400
Computer & printer	1	240	240	1.0	240
Printer	1	125	125	.25	32
Tape Recorder	1	25	25	.0	0
Air Cleaner	1	50	50	1.0	25
Air Cleaner	1	25	25	1.0	25
Coffee Pot	1	800	800	1.0	800
Stereo	1	65	65	0	0
Coffee Pot	1	600	600	1.0	600
Coffee Pot	1	1050	1050	1.0	1050
Refrigerator	1	40	40	.5	20
Space Heater	3	1500	4500	1.0	4500
Space Heater	2	300	600	1.0	600
Ionizer	1	50	50	1.0	50
Portavac	1	120	120	.0	0
Adding Machine	2	200	400	.0	0
Copier	1	1000	1000	.6	500
					(9,032)
201					
Microphones				0	0
Elections					
Beehive	1	55 W	55	1.0	55
Typewriters	2	100	200	1.0	200
Adding Machine	1	200	200	.0	0
Election Machines	3			.0	0
Pencil Sharpener	1	100	100	.0	0
Radio	1	6	6	1.0	6
Coffee Pot	1	1625	1625	1.0	1625
					(1,886)
Clerk and Recorder					
Microfilm Reader/Printer	4	80	320	.25	80
Cannon/PC Printer	1	120	120	0	0
Copy Machine	1	1000	1000	1.0	1000
Typewriters	5	100	500	1.0	500
Adding Machines	3	200	600	.25	200
Beehive Computers	3	55	165	1.0	165
Time Recorders	2	4	8	.0	0
Pencil Sharpener	1	100	100	.0	0
Large Fans	2	50	100	.0	0
Small Fan	1	40	40	.0	0
Coffee Pot	1	1625	1625	1.0	1625
					(3,570)

DESCRIPTION	NO.	HP/WATTS	TOTAL WATTS	U.F.	ADJ. WATTS
Auditor					
Beehive	1	55	55	1.0	55
Printer	1	120	120	0	0
Typewriters	2	100	200	1.0	200
Adding Machines	3	200	600	.50	300
Check Printer	1	55	55	.0	0
Radio	2	11	11	1.0	11
Coffee Pot	1	1200	1200	1.0	1200
					(1,766)
Employee Lunch Room					
Refrigerator	3	500	1500	.5	750
Pop Machine	1	300	300	.5	150
					(900)
Smoking Lunch Room					
Refrigerator	1	300	300	.5	150
Microwave	1	600	600	.0	0
Air Cleaner	1	50	50	1.0	50
					(200)
Accounting					
Beehives	5	55	275	1.0	275
Typewriters	5	100	500	1.0	500
Adding Machine	6	200	1200	.25	300
Printers	1	250	250	.5	125
Lamp	1	80	80	.0	0
Radio	1	16	16	1.0	16
Coffee Pot	1	1200	1200	1.0	1200
Space Heater	1	1650	1650	1.0	1650
Space Heater	1	1500	1500	1.0	1500
					(5,566)
Sheriff					
Chargers	10	150	1500	1.0	1500
Typewriter	22	100	2200	1.0	2200
Adding Machines	6	200	1200	.25	300
Xerox Machine	1	1000	1000	1.0	1000
Radio Charger	1	1875	1875	1.0	1875
Computer Printer	4	240	960	.25	240
Recorder	3	20	60	0	0
Film Machine	1	3	3	0	0
Cassette Recorder	1	33	33	0	0
Paper Dryer	1	7	7	0	0
Microfilm Viewer	1	80	80	0	0
Refrigerator	1	500	500	.5	250

DESCRIPTION	NO.	HP/WATTS	TOTAL WATTS	U.F.	ADJ. WATTS
Sheriff (Continued)					
T.V.	2	50	100	.25	25
Temperature Control	1	55	55	0	0
Power Supply	1	200	200	1.0	200
Photo Machine	1	75	75	0	0
Drum base	1	15	15	0	0
Timer	2	7	14	0	0
Luminator	1	3	3	0	0
Film Dryer	1	300	300	0	0
Lights	4	100	400	1.0	400
Radio	4	24	24	1.0	24
Radio	5	10	50	1.0	50
Microwave	1	500	500	1.0	0
Coffee Pot	1	1480	1480	1.0	1480
Fan	3	50	50	.0	0
Coffee Warmer	1	25	25	1.0	25
Shoe Shiner	1			0	0
Air Cleaners	2	50	50	1.0	50
Space Heater	1	1650	1650	1.0	1650
Stereo	3	70	210	.25	52
Polygraph Machine	1			0	0
					(11,221)
3rd Floor Hallway					
Coffee Machine	1	2800	2800	1.0	2800
Coke Machine	1	300	300	.5	150
					(2,950)
Justice Court					
Beehives	5	55	165	1.0	165
Typewriters	6	100	600	1.0	600
Adding Machines	5	200	1000	.5	500
Coffee Pot	1	1250	1250	1.0	1250
Printer	2	125	250	.25	62
Microphones	6			0	0
Recorder	1	7	7	1.0	1500
Coffee Pot	1	1500	1500	1.0	10
Clock	2	5	10		
					(4,077)
3rd Floor Small Room					
Coffee Pots	3	800	2400	1.0	2400
Typewriter	1	100	100	1.0	100
					(2,500)

DESCRIPTION	NO.	HP/WATTS	TOTAL WATTS	U.F.	ADJ. WATTS
Attorneys					
Typewriters	6	100	600	1.0	600
Computers	4	200	800	1.0	800
Printers	3	125	375	.25	94
Xerox	1	1000	1000	1.0	1000
Refrigerator	1	500	500	.5	250
Coffee Pot	1	600	600	1.0	600
Coffee Pots	2	1080	2160	1.0	2160
Radios/Clocks	3	6	18	1.0	18
					(5,522)
Personnel					
	3	55	165		
Beehive	3	100	300	1.0	165
Typewriter	6	200	1200	1.0	300
Adding Machine	1	125	125	.25	300
Printers	1	1250	1250	.0	0
Space Heater	2	600	1200	1.0	1250
Coffee Pot	2	5	10	1.0	1200
Radio	1	625	625	1.0	10
Coffee Pot	1	1500	1500	.0	0
Space Heater				1.0	1500
					(4,725)
Surveyor					
Microfilm Viewer	2	80	160	.25	40
Typewriters	3	100	300	1.0	300
Adding Machine	2	200	400	.5	200
Beehive	3	55	165	1.0	165
G.E. Base Station	2	50	100	1.0	100
Refrigerator	1	500	500	.5	250
Electric Eraser	9	30	270	.25	68
Calculator	4	7	28	1.0	28
Space Heater	1	1500	1500	1.0	1500
Space Heater	1	1850	1850	.5	925
Radio	4	6	24	1.0	24
Pencil Sharpener	1	100	100	1.0	100
Lamps	8	36	288	.5	144
Lettering Machine	1	360	360	.5	180
Light Table	1	300	300	.0	0
Coffee Pot	1	575	575	.0	0
Blueprint Machine	1	4100	4100	1.0	4100
Radio Charger	2	4	8	1.0	8
Coffee Pot	1	1100	1100	1.0	1100
Comptuer/Printer	1	125	125	1.0	125
Adding Machine	1	500	500	1.0	500
					(9,803)

DESCRIPTION	NO.	HP/WATTS	TOTAL WATTS	U.F.	ADJ. WATTS
Youth Court					
Typewriter	2	300	600	1.0	600
Adding Machine	2	200	400	.25	100
Radio	5	6	30	1.0	30
Coffee Pot	1	1500	1500	1.0	1500
Computer/Printer	1	250	250	1.0	250
Coffee Pot	1	650	650	.0	650
Coffee Pot	1	1090	1090	1.0	1090
					(4,220)
Judge Green					
Typewriter		300	300	1.0	300
Coffee Pot		600	600	1.0	600
Coffee Pot		650	650	1.0	650
Overhead Projector				.0	0
Space Heater		1500	1500	1.0	1500
					(3,050)
Clerk of Court					
Typewriter	14	300	4200	1.0	4200
Adding Machine	3	200	600	.25	150
Copy Machine	1	1000	1000	.5	500
Microfilm Viewer	1	800	800	.0	0
Space Heater	2	1500	3000	1.0	3000
Fan	1	40	40	.0	0
Beehive	1	55	55	1.0	55
					(7,905)
Sandwich Shop					
Refrigerators	2	300	600	1.0	600
Microwave	1	500	500	.0	0
					(600)
Drivers					
Typewriters	3	100	300	1.0	300
Eye Machine	1	12	12	1.0	12
Photograph Machine	1	300	300	.5	150
T.V.	1	100	100	.0	0
Fans	1	40	40	0	0
Space Heater	1	1300	1300	.0	0
					(462)

DESCRIPTION	NO.	HP/WATTS	TOTAL WATTS	U.F.	ADJ. WATTS
Motor Vehicles					
Typewriters	10	100	1000	1.0	1000
Adding Machines	12	200	2400	.5	1200
Space Heater	1	1200	1200	1.0	1200
Computer	4	240	960	1.0	960
Printer	2	125	250	.5	125
Refrigerator	1	500	500	.5	250
Xerox	1	1000	1000	1.0	1000
Toaster	1	900	900	.0	0
Popcorn Popper	1	450	450	0	0
Coffee Pot	3	1200	3600	.5	1800
Fan	1	300	300	0	0
					(7,535)
Assessor					
Beehives	8	55	440	1.0	440
Typewriters	1	100	100	1.0	100
Adding Machines	19	200	3800	.5	1900
Xerox	1	1000	1000	1.0	1000
Computer	1	240	240	1.0	240
Printers	1	125	125	.5	62
Microfilm Viewer	1	80	80	.0	0
Coffee Pot	4	1080	4320	1.0	4320
Radio	1	7	7	1.0	7
Clock	1	5	5	1.0	5
Space Heater	1	1200	1200	1.0	1200
Coffee Pot	2	600	1200	1.0	1200
Air Cleaner	1	50	50	1.0	50
					(10524)
Treasurer					
Xerox	1	1000	1000	1.0	1000
Adding Machines	18	200	3600	.5	1800
Beehives	7	55	385	1.0	385
Computer	1	240	240	1.0	240
Printer	1	125	125	.5	62
Typewriter	1	100	700	1.0	700
Fan	7	50	250	.0	0
Microfilm Viewer	5	80	80	.0	0
	1				(4,187)
Switchboard					
Typewriter	1	100	100	1.0	100
Computer	1	240	240	1.0	240
Digital Words	2	50	100	1.0	100
Fan	1	50	50	0	0
Coffee Pot	1	850	850	1.0	850
					(1,290)

DESCRIPTION	NO.	HP/WATTS	TOTAL WATTS	U.F.	ADJ. WATTS
Courtrooms (3)					
Baseboard Heaters	9	1500	13,500	1.0	13,500
Coffee Pots	2	1060	2,120	.5	1,060
					(14,560)
Judge Harkin/Wheelis					
Adding Machine	1	200	200	.0	0
Tape Recorder	2	25	50	.0	0
Typewriter	2	100	200	1.0	200
Coffee Pot	1	800	800	1.0	800
Computer/Printer	1	300	300	1.0	300
Small Refrigerator	1	300	300	.5	150
Hot Choc. Maker	1	800	800	0	0
Clock	1	7	7	1.0	7
					(1,457)
Judge Henson					
Typewriter	3	100	300	1.0	300
Coffee Pot	1	650	650	1.0	650
Adding Machine	1	200	200	.0	0
Computer/Printer	1	300	300	1.0	300
Space Heater		1250	1250	1.0	1250
Radio		7	7	1.0	7
Stenotypes	3	8	24	1.0	24
					(2531)
Jail					
Refrigerator	1	500	500	.5	250
Mixer	1	1/3 hp	249	0	0
Microphone	1	500	500	0	0
Coffee Pot	1	1995	1995	1.0	1995
Coffee Pot	1	1090	1090	0	0
Coffee Pot	1	1090	1090	1.0	1090
Dishwasher	1	600	600	1.0	600
Pump	1	3000	3000	1.0	3000
Toaster	1	2800	2800	.0	0
Radio	8	7	56	1.0	56
Freezer walk-in	1	1300	1300	1.0	1300
Refrigerator "	1	1000	1000	1.0	1000
Computer/Printer	1	300	300	1.0	300
Typewriter	2	100	200	1.0	200
T.V. Cameras	3	27	81	1.0	81
Flashlight Charger	2	300	600	1.0	600
T.V.'s	12	100	1200	1.0	1200
Washers	2	4200	8400	0	0
Sewing Machine	1	50	50	0	0
Clocks	6	7	42	1.0	42
					(11,714)

DESCRIPTION	NO.	HP/WATTS	TOTAL WATTS	U.F.	ADJ. WATTS
Central Stores					
Computer	2	60	120	1.0	120
Beehive	2	55	110	1.0	110
Printer	1	154	154	.5	770
Typewriter	3	100	300	.5	1500
Adding Machine	5	200	1000	.25	250
Air Cleaner	1	50	50	1.0	50
Radio	1	10	10	1.0	10
Postage Equip.			1422		
Scale (large)	1	120	120	.0	0
Postage Meter (large)	1	60	60	.0	0
Postage Meter (small)	1	60	60	.0	0
Small Postage Machine	1	408	408	.0	0
Main Terminal	1	96	96	.0	0
Remote Terminal	1	48	48	.0	0
Parcel Register	1	240	240	.0	0
Power Stacker	1	360	360	.0	0
15# Scale	1	30	30	.0	0
					(2,810)
Printing					
Master Maker	1	2400	2400	.24	1000
Litho	1	1200	1200	1.0	1200
Gollator	1	870	870	1.0	870
Bertha	1	490	490	1.0	490
Microfilm					(3,560)
Iron	2	1100	2200	1.0	2200
Fan	2	50	100	1.0	0
Air Cleaner	1	50	50	1.0	50
Microfilm Printer	1	410	410	.0	0
Adding Machine	1	200	200	.0	0
Microseal	1	65	65	.0	0
Microfilm	1	65	65	.0	0
TD 502	1	50	50	.0	0
Typewriter	11	100	200	1.0	200
Filemaster (camera)	1	2 A	250	1.0	250
Recordack	1	.5 A	50	.5	25
Beehive	1	60	60	1.0	60
Film Checker	1	60	60	1.0	60
Processor	1	40	40	1.0	40
Film Machine	1	15 A	1000	1.0	1000
Refrigerator	1	300	300	.5	150
Clock	1	10	10	1.0	10
					(4,845)

DESCRIPTION	NO.	HP/WATTS	TOTAL WATTS	U.F.	ADJ. WATTS
General Services					
Charger	1	25	25	1.0	25
Computer	1	150	150	1.0	150
Typewriter	1	100	100	1.0	100
Radio	1	14	14	1.0	14
Beehive	1	110	110	1.0	110
					(399)
Maintenance Managers					
Recorder	1	50	50	.5	10
Lamp	1				
Adding Machine	1	100	100	.0	0
Printer	1	200	200	.0	0
Computer	1	150	150	1.0	150
Beehive	1	100	100	1.0	100
Radio	1	10	10	.0	0
					(260)
Conference Room					
Coffee Pot	1	1060	1060	1.0	1060
					(1,060)
DES					
Computer/Printer	1	250	250	1.0	250
Typewriter	1	100	100	1.0	100
Light Charger	1	50	50	1.0	50
T.V.	1	50	50	0	0
Video Recorder	1	20	20	0	0
Chargers	1	1000	1000	1.0	1000
Adding Machine	1	200	200	.0	0
					(1,450)
Records Management					
Typewriter	1	100	100	1.0	100
Beehive	1	110	110	1.0	110
Microfilm	1	55	55	0	0
Linear Amps	2	500	1000	0	0
					(210)
Data Processing					
Beehive	8	110	880	1.0	880
Intercom	1	5	5	1.0	5
Decollator	1	1/3 hp	249	.5	124
Burster	1	400	400	.5	200
Coffee Pot	1	800	800	1.0	800
Typewriter	2	100	200	1.0	200
Printer (small)	1	100	100	.5	50
Radio	1	10	10	0	0
Burroughs Comp.	1	150	150	1.0	150
Adding Machine	2	200	400	.0	0
Coffee Pot	1	1625	1625	.0	0
Popcorn Popper	1	1150	1150	0	0
					(2,409)

DESCRIPTION	NO.	HP/WATTS	TOTAL WATTS	U.F.	ADJ. WATTS
Hallways					
Surveillance Equipt	10	150	1500	1.0	1500
Water Fountains	4	1000	4000	.2	800
Elevator	1				(2,300)
911					
Oven	1	1000	1000	.0	0
Microwave	1	500	500	.0	0
Toaster Oven	1	2000	200	0	0
Toaster	1	1050	1050		1050
Coffee Maker	2	1050	1050	1.0	1050
Refrigerator	1	800	800	.5	400
Radio	1	10	10	1.0	10
Clock	2	5	5	1.0	5
Computers	2	110	220	1.0	220
					(2,735)
Major Equipment					
Annex Basement Chiller	1	7580	7580	.5	3790
Air Handling Unit	1	1860	1860	1.0	1860
Fan #4	1	390	390	1.0	390
AHU #5	1	1200	1200	1.0	1200
Roof Exhaust #2	1	350	350	1.0	350
Exhaust Fan #6	1	690	690	1.0	690
AHU #2	1	4200	4200	1.0	4200
Fan # 3	1	850	850	1.0	850
AHU # 3	1	3510	3510	1.0	3510
Fan #2	1	840	840	1.0	840
AHU # 1	1	1900	1900	1.0	1900
Fan #1	1	1140	1140	1.0	1140
Jail Fan	1	3800	3800	1.0	3800
Temp Control Pump	1	620	620	.75	465
Boiler Feed Pumps	1	800	800	1.0	800
Roof Exhaust	4	130	130	1.0	130
Air Filter	1	60	240	1.0	240
Roof Exhaust	1	220	220	1.0	220
Basement heaters	1	60,000	60,000	.2	12,000
Elevator #1	1	7500	7500	.5	3750
Elevator #2	1	7700	7700	.5	3850
Elevator #3	1	3000	3000	.5	1500
911 Center	1	6000	6000	1.0	6000
911 A.C.	1	9830	9830	1.0	9830
Mainframe	1	10520	10520	1.0	10520
Air Conditioning	1	11830	11830	1.0	11830
					(85,435)

EXHIBIT B

ENERGY CONSUMPTION FILE

FACILITY COUNTY COURTHOUSE
ADDRESS 230 W. BROADWAY
MISSOULA MT 59802

ACCOUNT NO. 96417002
AREA OF BUILDING 84000 SQ.FT.
BASE TEMPERATURE 65 °F.
COOLING DDAYS INCLUDED Y

DATES 840101 - 850130

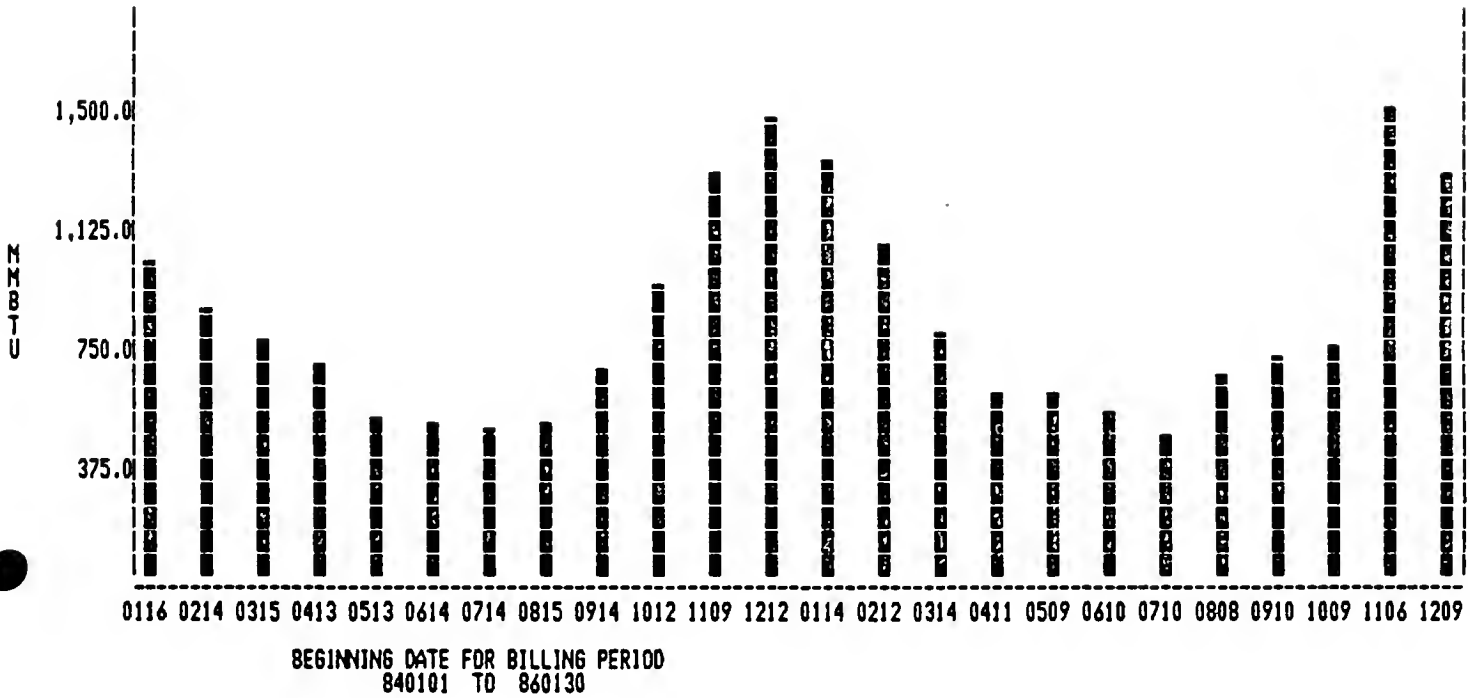
					DOLLAR COST				E.U.I.			BTU/SF/MONTH		
BEG. DATE	KWH	KW	MCF	DD	KWH	KW	GAS	TOTAL	EL.	GAS	TOT.	ELECT.	GAS	TOTAL
840116	135200	320	548	1096	2602.51	549.78	2492.66	5644.96	5.0	6.0	11.0	5492	6524	12016
840214	126200	302	425	888	2452.68	518.27	1929.33	4900.28	5.8	5.7	11.5	5126	5060	10186
840315	113400	300	364	693	2310.47	525.28	1667.12	4502.87	6.6	6.3	12.9	4606	4333	8940
840413	111800	284	308	572	2269.65	496.70	1410.64	4176.99	7.9	6.4	14.3	4541	3667	8208
840513	100600	302	180	434	1775.56	793.71	824.40	3393.67	9.4	4.9	14.4	4086	2143	6229
840614	110000	250	117	145	1936.47	652.36	535.86	3124.69	30.8	9.6	40.4	4468	1393	5861
840714	119000	320	81	174	2090.53	842.63	370.98	3304.14	27.8	5.5	33.3	4834	964	5798
840815	105000	304	130	192	1850.88	799.14	595.40	3245.42	22.2	8.1	30.3	4265	1548	5813
840914	94000	284	354	397	1662.58	744.78	1621.32	4028.68	9.6	10.6	20.2	3818	4214	8032
841012	108400	300	564	792	2290.94	1182.40	2583.12	6056.47	5.6	8.5	14.0	4403	6714	11117
841109	130720	320	830	1195	2749.44	1263.95	3801.40	7814.79	4.4	8.3	12.7	5310	9881	15191
841212	149400	326	948	1528	3133.16	1288.41	4324.67	8746.24	4.0	7.4	11.4	6068	11286	17354
YEARLY	1403720		4849	8106	27124.90	9657.42	22156.90	58939.20	7.0	7.1	14.2	57018	57726	114744

DATES 850101 - 860130

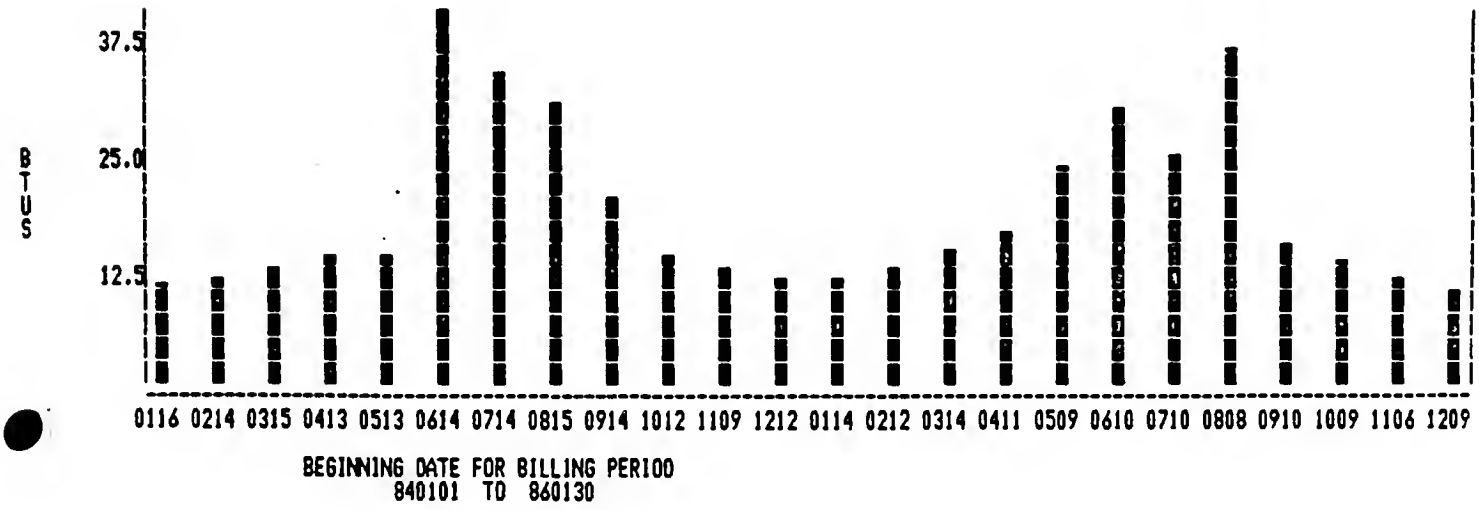
					DOLLAR COST				E.U.I.			BTU/SF/MONTH		
BEG. DATE	KWH	KW	MCF	DD	KWH	KW	GAS	TOTAL	EL.	GAS	TOT.	ELECT.	GAS	TOTAL
850114	136000	326	859	1337	3756.26	1350.87	3542.87	8650.00	4.1	7.6	11.8	5524	10226	15750
850212	126800	320	622	1002	3505.62	1325.22	2562.17	7393.00	5.1	7.4	12.5	5150	7405	12555
850314	103000	298	431	639	2380.87	769.08	1783.48	4933.43	6.5	8.0	14.6	4184	5131	9315
850411	94000	280	275	428	2176.55	721.01	1137.95	4035.51	8.9	7.6	16.6	3818	3274	7092
850509	106000	298	237	303	2448.98	769.08	980.71	4198.76	14.2	9.3	23.5	4306	2821	7127
850610	111800	326	148	212	2584.02	843.85	612.42	4040.29	21.4	8.3	29.7	4541	1762	6303
850710	115800	318	72	226	2855.20	877.80	297.94	4030.94	20.8	3.8	24.6	4704	857	5561
850808	111600	298	260	212	2753.43	820.80	1075.88	4650.11	21.4	14.6	36.0	4533	3095	7628
850910	97000	314	380	557	2455.66	886.77	1572.44	4914.87	7.1	8.1	15.2	3940	4524	8464
851009	98800	318	408	670	2500.30	898.44	1688.30	5087.04	6.0	7.2	13.2	4013	4857	8870
851106	138200	338	1015	1568	4172.29	1531.65	4200.07	9904.01	3.6	7.7	11.3	5614	12083	17697
851209	125200	338	855	1466	3785.41	1531.65	3526.32	8843.38	3.5	6.9	10.4	5086	10179	15264
YEARLY	1364200		5562	8620	35374.60	12326.20	22980.50	70681.40	6.4	7.7	14.1	55413	66214	121627

COUNTY COURTHOUSE
230 W. BROADWAY
MISSOULA MT 59802

TOTAL ENERGY USE PER MONTH (MMBTU)

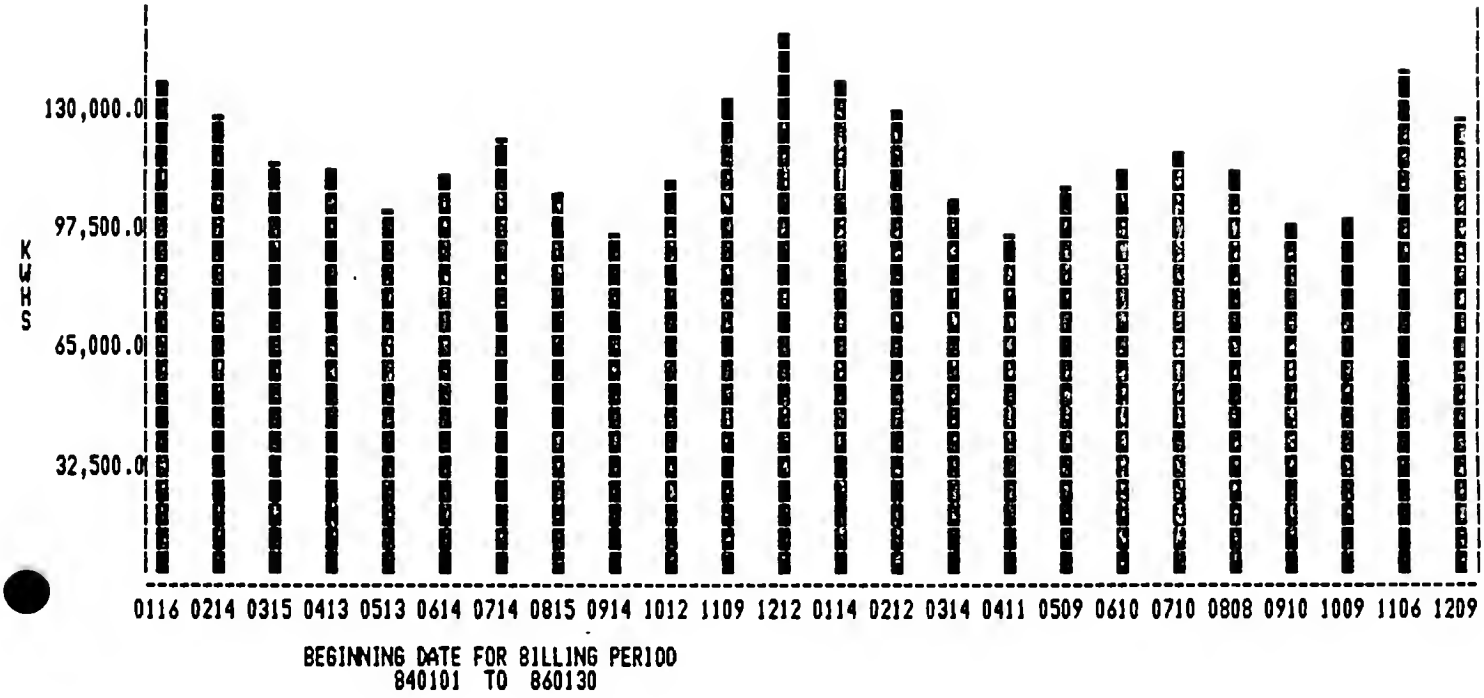


ENERGY USE PER SQUARE FOOT PER DEGREE DAY (BTU'S)
(BALANCE TEMPERATURE - 65)
Total degree days

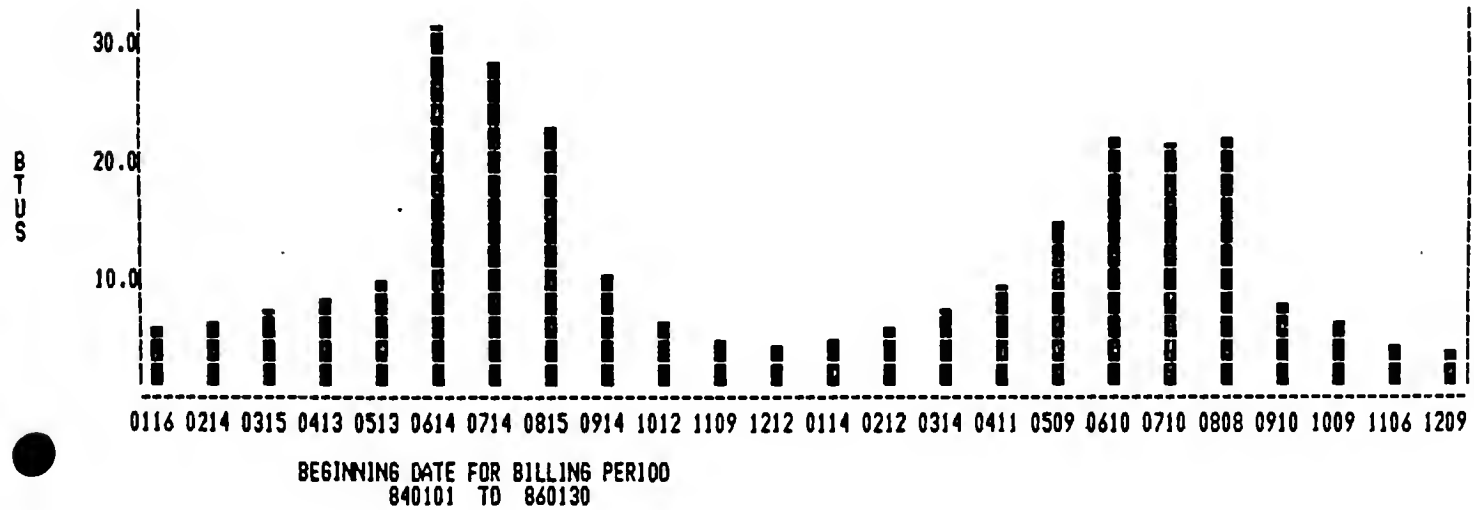


COUNTY COURTHOUSE
230 W. BROADWAY
MISSOULA MT 59802

ELECTRIC USE PER MONTH (KWH)

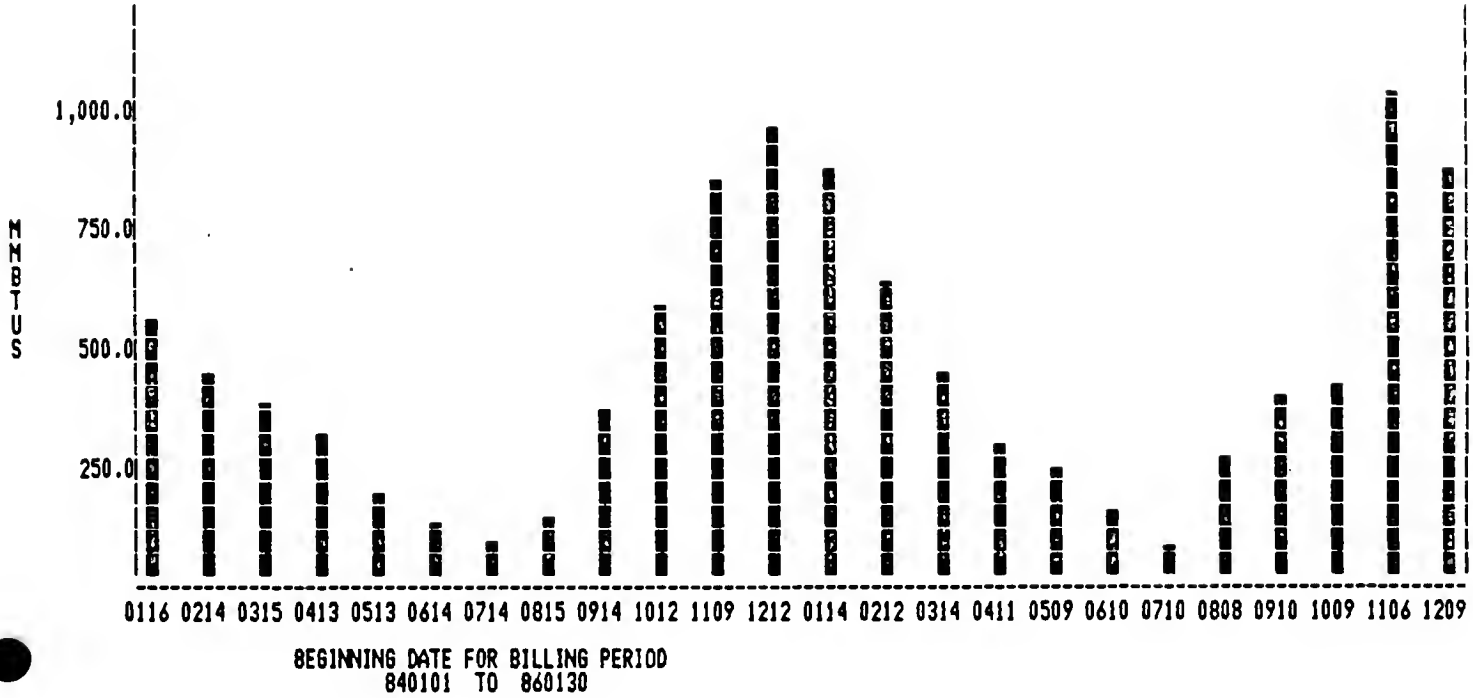


ELECTRIC USE PER SQUARE FOOT PER DEGREE DAY (BTU'S)
(BALANCE TEMPERATURE - 65)
Total degree days

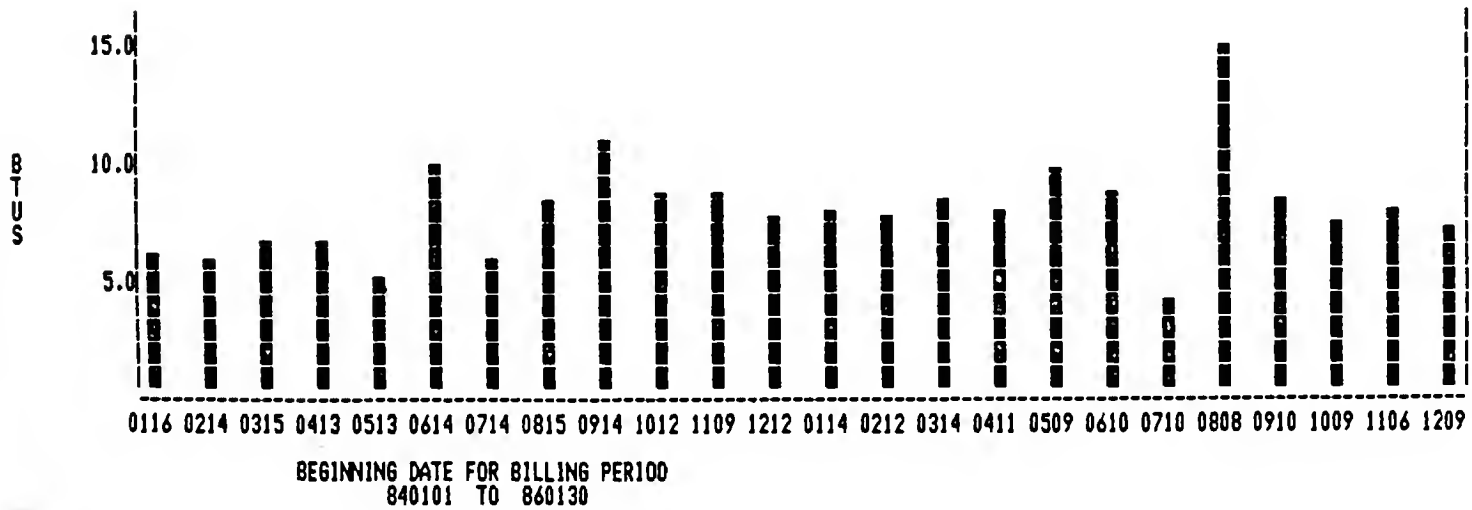


COUNTY COURTHOUSE
230 W. BROADWAY
MISSOULA MT 59802

GAS USE PER MONTH (MMBTU'S)

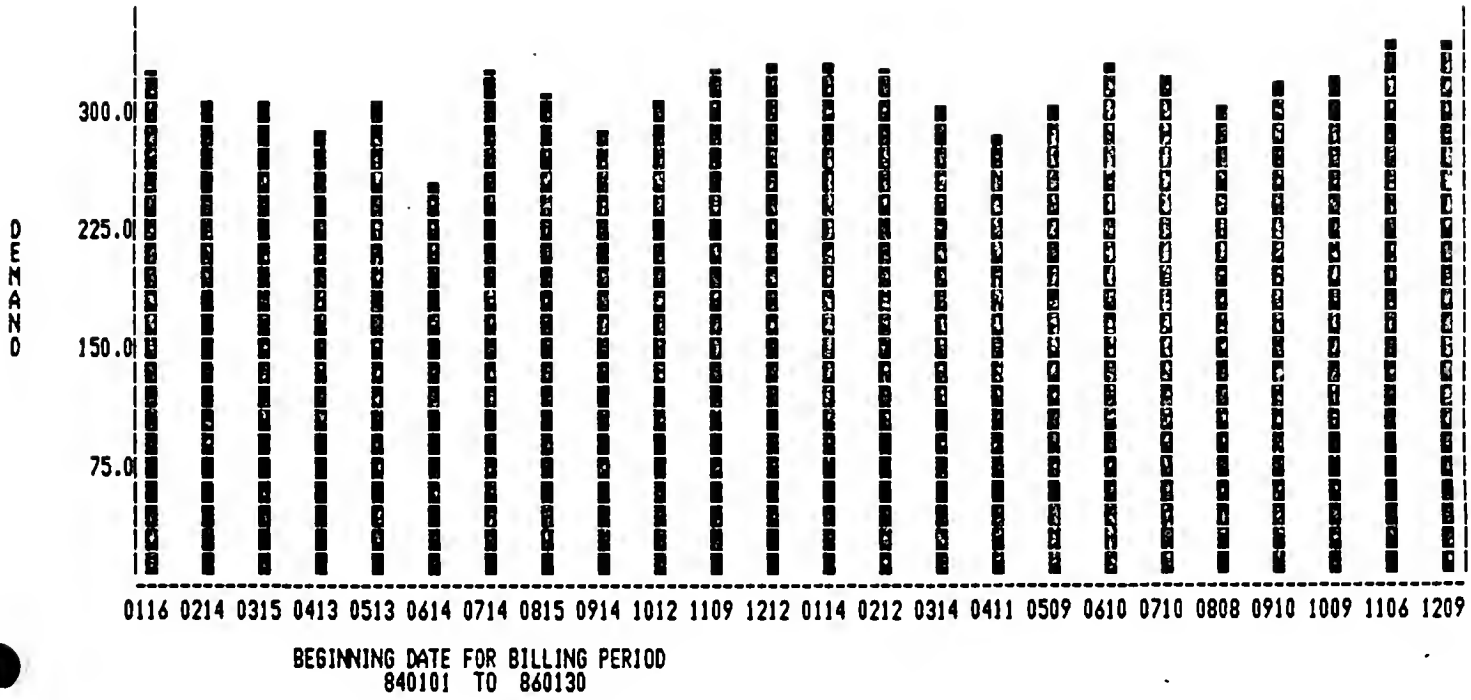


GAS USE PER SQUARE FOOT PER DEGREE DAY (BTU'S)
(BALANCE TEMPERATURE - 65)
Total degree days

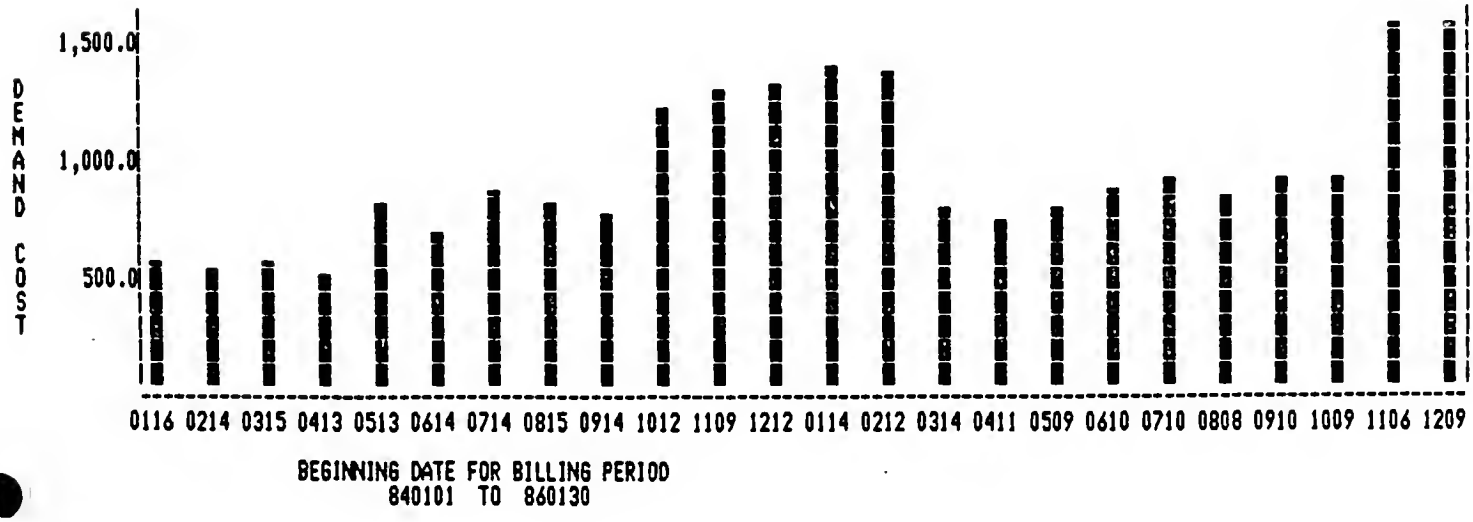


COUNTY COURTHOUSE
230 W. BROADWAY
MISSOULA MT 59802

KILOWATT DEMAND PER MONTH

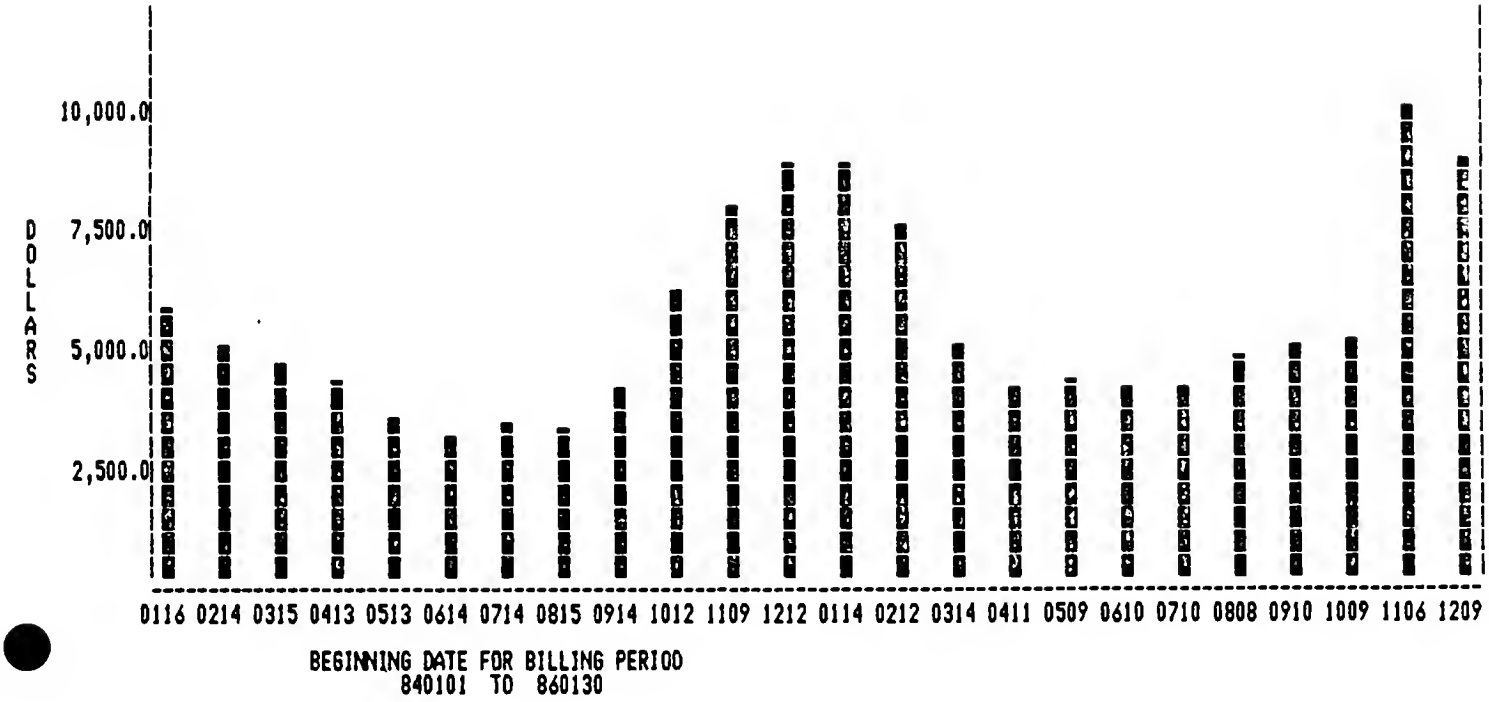


DEMAND COST PER MONTH

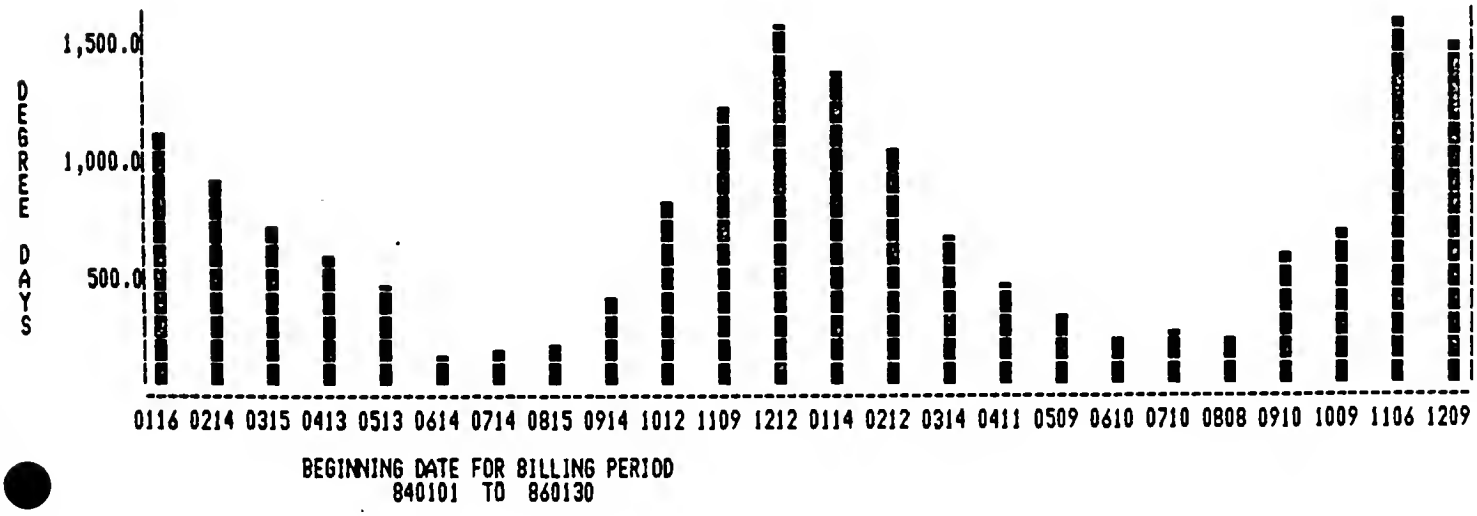


COUNTY COURTHOUSE
230 W. BROADWAY
MISSOULA MT 59802

TOTAL ENERGY COST PER MONTH ($)



TOTAL DEGREE DAYS PER MONTH (HEATING AND COOLING)



ENERGY CONSUMPTION FILE

FACILITY COUNTY COURTHOUSE
ADDRESS 230 W. BROADWAY
MISSOULA MT 59802

ACCOUNT NO. 964170002
AREA OF BUILDING 84000 SQ.FT.
BASE TEMPERATURE 55 °F.
COOLING DDAYS INCLUDED Y

DATES 830101 - 840131

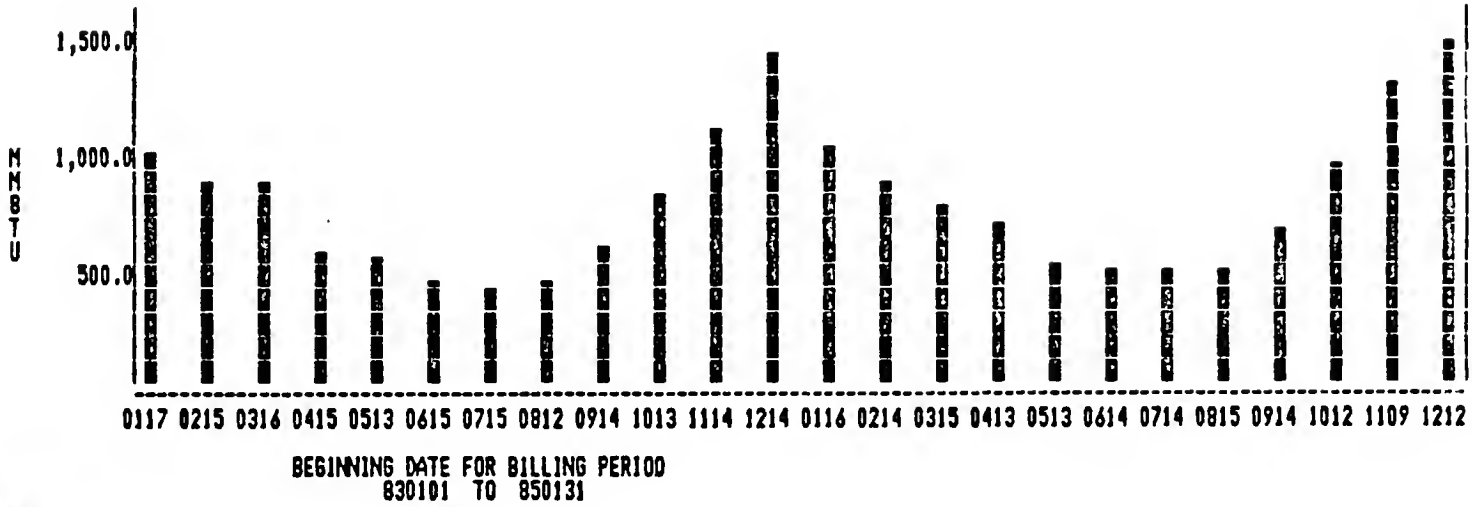
					DOLLAR COST				E.U.I.			BTU/SF/MONTH		
BEG. DATE	KWH	KW	MCF	DD	KWH	KW	GAS	TOTAL	EL.	GAS	TOT.	ELECT.	GAS	TOTAL
830117	127800	340	548	697	2550.84	592.98	2492.66	5636.49	7.4	9.4	16.8	5191	6524	11715
830215	94200	258	533	404	1968.00	447.42	2441.14	4856.56	9.5	15.7	25.2	3826	6345	10172
830316	104000	264	515	482	2119.02	458.07	2358.70	4935.79	8.8	12.7	21.5	4224	6131	10355
830415	90400	256	261	225	1883.44	437.74	1195.38	3516.56	16.3	13.8	30.1	3672	3107	6779
830513	115000	302	134	208	2289.62	518.27	613.72	3421.61	22.5	7.7	30.1	4671	1595	6266
830615	105000	302	69	178	2144.03	518.27	316.02	2978.32	24.0	4.6	28.6	4265	821	5086
830715	104200	302	61	360	2132.38	518.27	279.38	2930.04	11.8	2.0	13.8	4233	726	4959
830812	106200	296	73	272	2155.24	507.77	334.34	2997.34	15.9	3.2	19.1	4314	869	5183
830914	92200	260	285	250	1913.82	444.74	1305.30	3663.86	15.0	13.6	28.6	3745	3393	7138
831013	105200	264	466	405	2107.26	451.74	2131.99	4691.00	10.6	13.7	24.2	4273	5542	9815
831114	122600	338	680	853	2437.86	581.30	3114.40	6133.56	5.8	9.5	15.3	4980	8095	13075
831214	142800	338	928	1317	2731.95	581.30	4233.07	7546.32	4.4	8.4	12.8	5800	11048	16848
YEARLY	1309600		4553	5651	26433.50	6057.87	20816.10	53307.40	9.4	9.6	19.0	53195	54196	107391

DATES 840101 - 850131

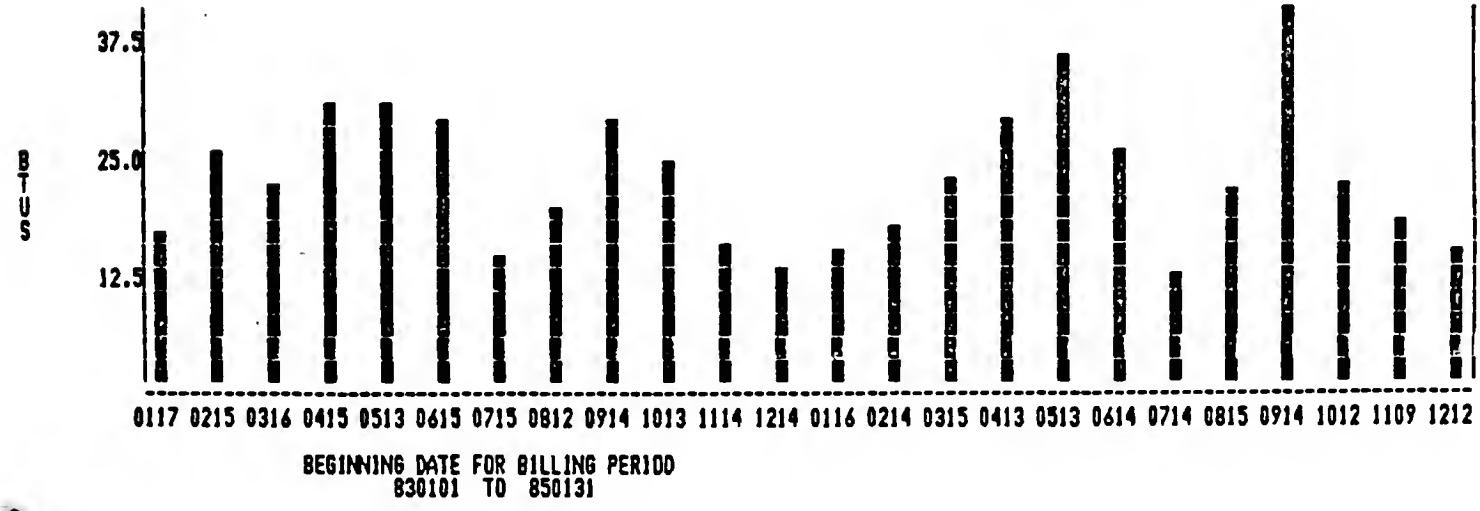
					DOLLAR COST				E.U.I.			BTU/SF/MONTH		
BEG. DATE	KWH	KW	MCF	DD	KWH	KW	GAS	TOTAL	EL.	GAS	TOT.	ELECT.	GAS	TOTAL
840116	135200	328	548	806	2602.51	549.78	2492.66	5644.96	6.8	8.1	14.9	5492	6524	12016
840214	126200	302	425	588	2452.68	518.27	1929.33	4900.28	8.7	8.6	17.3	5126	5060	10186
840315	113400	308	364	403	2310.47	525.28	1667.12	4502.87	11.4	10.8	22.2	4606	4333	8940
840413	111800	284	308	286	2269.65	496.70	1410.64	4176.99	15.9	12.8	28.7	4541	3667	8208
840513	100600	302	180	176	1775.56	793.71	824.40	3393.67	23.2	12.2	35.4	4086	2143	6229
840614	110008	250	117	229	1936.47	652.36	535.86	3124.69	19.5	6.1	25.6	4468	1393	5861
840714	119000	320	81	484	2090.53	842.63	370.98	3304.14	10.0	2.0	12.0	4834	964	5798
840815	105000	304	138	274	1850.88	799.14	595.40	3245.42	15.6	5.6	21.2	4265	1548	5813
840914	94000	284	354	191	1662.58	744.78	1621.32	4028.68	20.0	22.1	42.1	3818	4214	8032
841012	108400	300	564	512	2290.94	1182.40	2583.12	6056.47	8.6	13.1	21.7	4403	6714	11117
841109	130720	320	830	865	2749.44	1263.95	3801.40	7814.79	6.1	11.4	17.6	5310	9881	15191
841212	149400	326	948	1198	3133.16	1288.41	4324.67	8746.24	5.1	9.4	14.5	6068	11286	17354
YEARLY	1403720		4849	6012	27124.90	9657.42	22156.90	58939.20	9.5	9.6	19.1	57018	57726	114744

COUNTY COURTHOUSE
230 W. BROADWAY
MISSOULA MT 59802

TOTAL ENERGY USE PER MONTH (MMBTU)

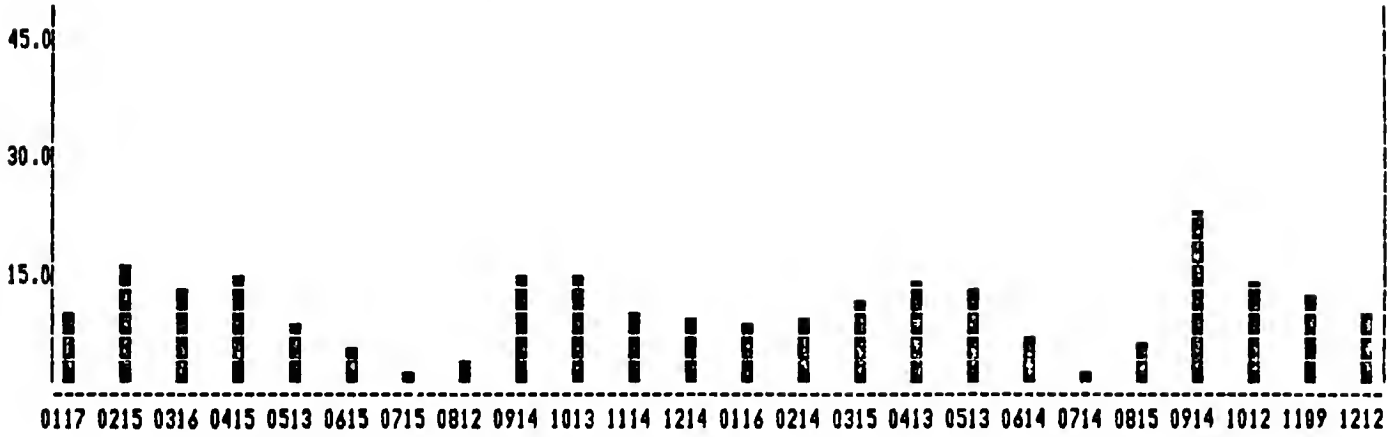


ENERGY USE PER SQUARE FOOT PER DEGREE DAY (BTU'S)
(BALANCE TEMPERATURE - 55)
Total degree days



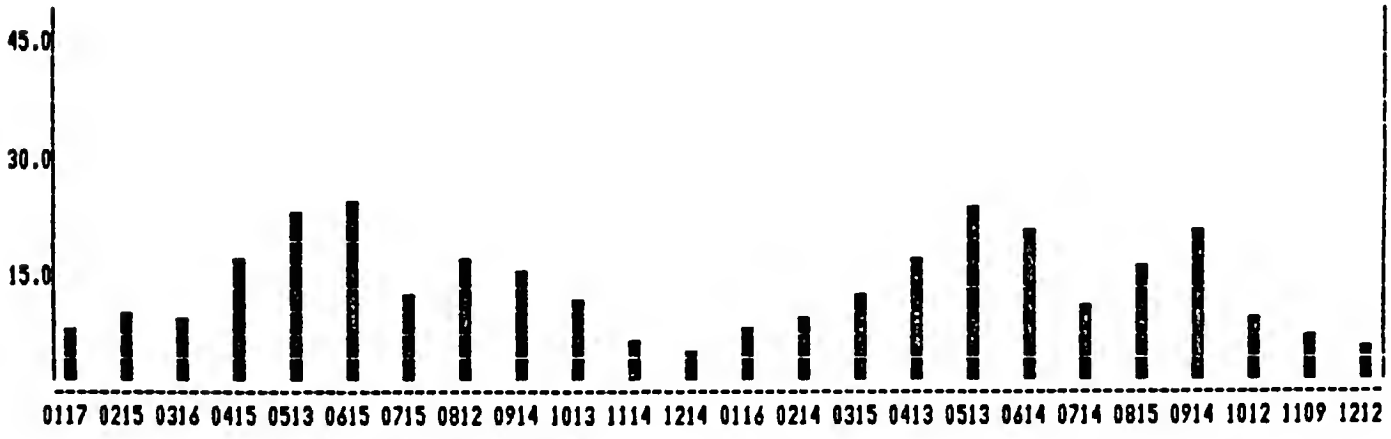
COUNTY COURTHOUSE
230 W. BROADWAY
MISSOULA MT 59802

GAS USE PER SQUARE FOOT PER DEGREE DAY (BTU'S)
(BALANCE TEMPERATURE - 55)
Total degree days



BEGINNING DATE FOR BILLING PERIOD
830101 TO 850131

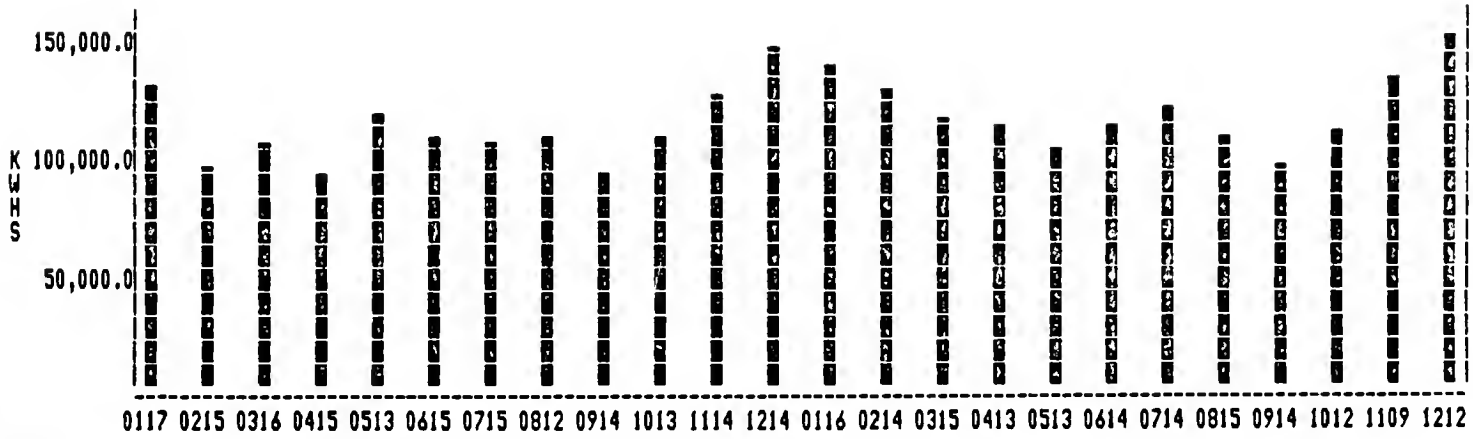
ELECTRIC USE PER SQUARE FOOT PER DEGREE DAY (BTU'S)
(BALANCE TEMPERATURE - 55)
Total degree days



BEGINNING DATE FOR BILLING PERIOD
830101 TO 850131

COUNTY COURTHOUSE
230 W. BROADWAY
MISSOULA MT 59802

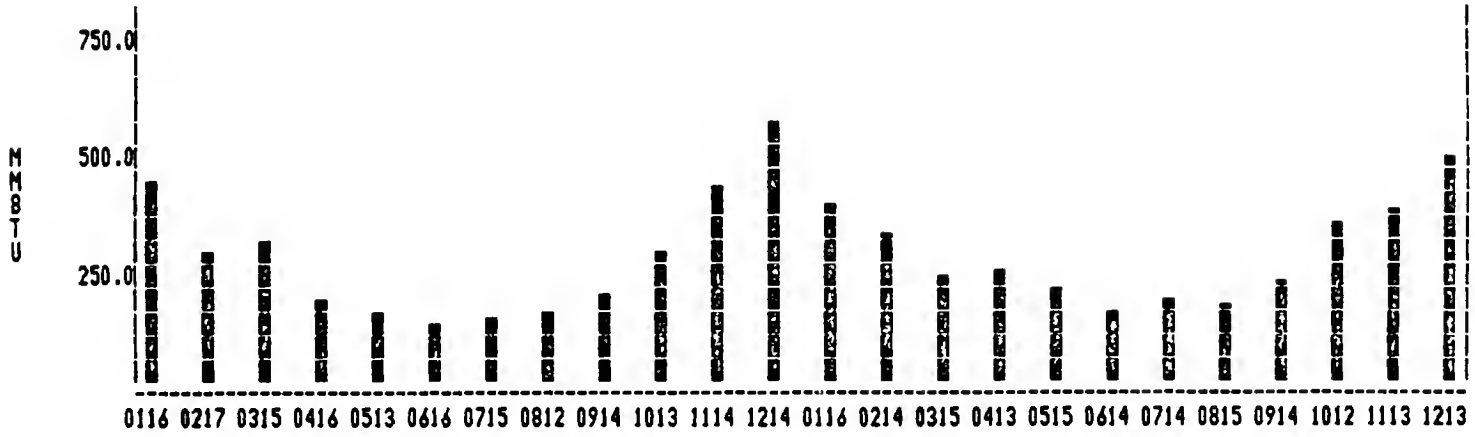
ELECTRIC USE PER MONTH (KWH)



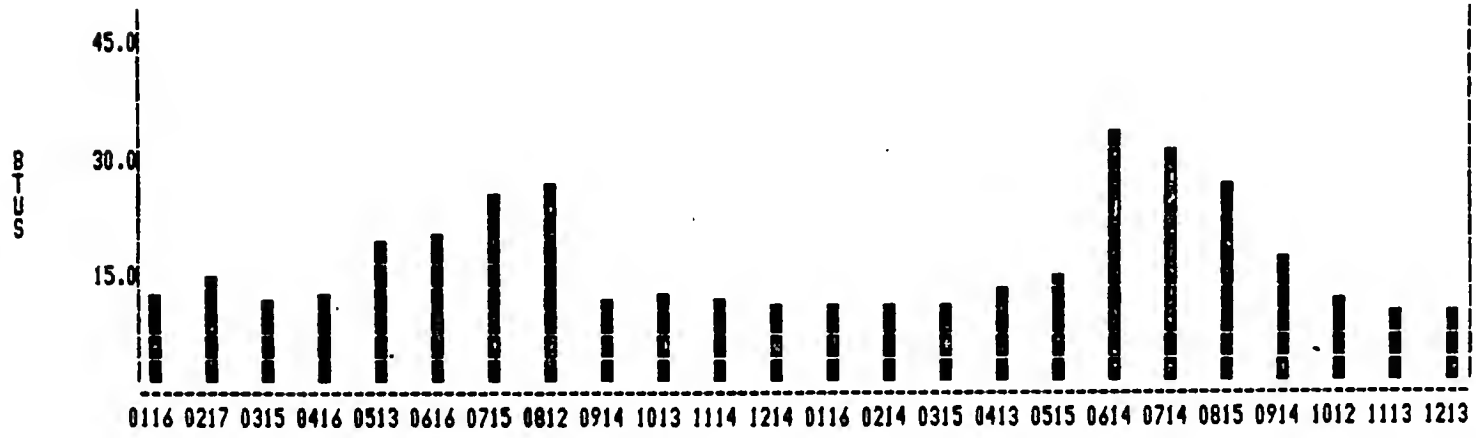
BEGINNING DATE FOR BILLING PERIOD
830101 TO 850131

CITY HALL
201 W. SPRUCE
MISSOULA MT 59802

TOTAL ENERGY USE PER MONTH (MMBTU)

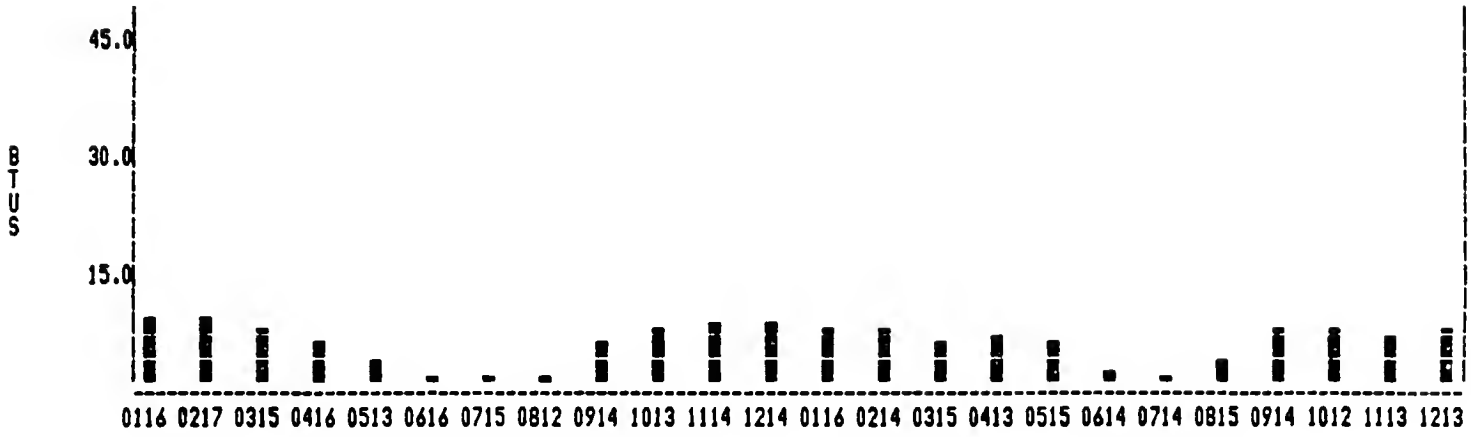


ENERGY USE PER SQUARE FOOT PER DEGREE DAY (BTU'S)
(BALANCE TEMPERATURE - 65)



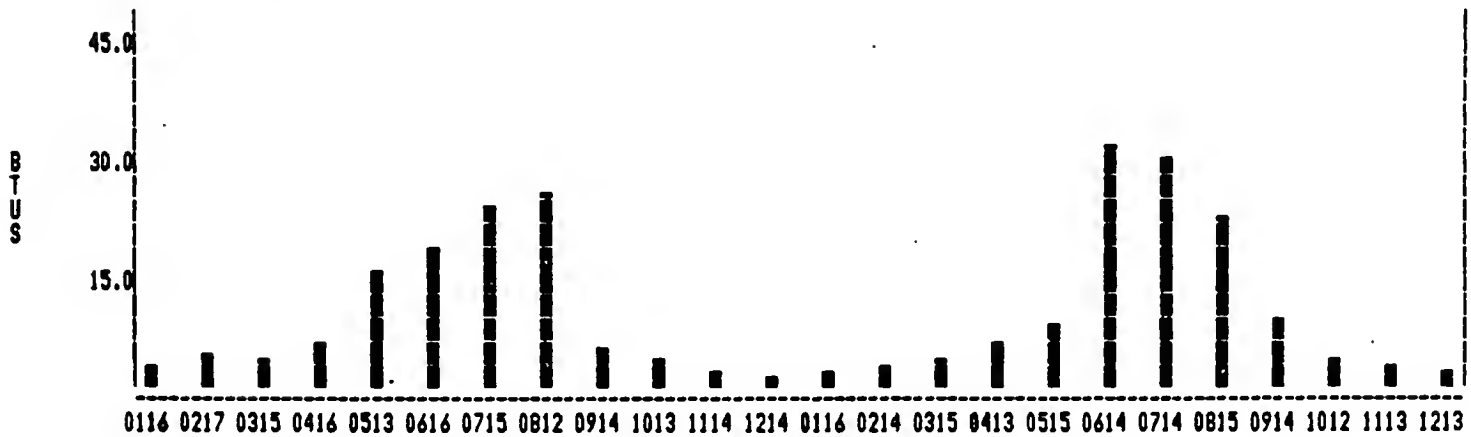
CITY HALL
201 W. SPRUCE
MISSOULA MT 59802

GAS USE PER SQUARE FOOT PER DEGREE DAY (BTU'S)
(BALANCE TEMPERATURE - 65)



BEGINNING DATE FOR BILLING PERIOD
830101 TO 850131

ELECTRIC USE PER SQUARE FOOT PER DEGREE DAY (BTU'S)
(BALANCE TEMPERATURE - 65)



BEGINNING DATE FOR BILLING PERIOD
830101 TO 850131

EXHIBIT C

LIGHTING INVENTORY

ROOM	NO. OF FIXTURES	WATTS/FIXTURE	TOTAL WATTS	U.F.	ADJ. WATTS
Commissioners					
	19	184	3496	1.0	3496
	8	92	736	1.0	736
	4	92	368	0	0
	1 I	60	60	1.0	60
Room 201	11	184	2024	.0	0
Corridor 2nd Floor	14	184	2576	.50	1288
	1	184	184	1.0	184
Clerk and Recorder	17	184	3128	1.0	3128
Elections	9	184	1656	1.0	1656
Fern	1	184	184	1.0	184
Auditor	5	184	920	1.0	920
Auditor D.I.D.	2	184	368	.5	184
Accounting	14	184	2576	1.0	2576
Employee Lunchroom	3	184	552	1.0	552
Smoking Lunchroom	6	184	1104	1.0	1104
Stairwell B-3rd					
3rd Floor hallway	8	184	1472	.5	736
Exit Light	1				
Sheriff	42	184	7728	1.0	7728
Personnel	20	184	3680	.5	3680
	8	184	1472	1.0	736
	7	184	1288	1.0	1288
	2	46	92	1.0	92
	2	92	184	1.0	184
	3	46	138		138
Decorative	42	60I	2520	1.0	2520
1st Floor	21	60I	1260	.5	630
Surveyor	11	184	2024	.5	1012
	11	184	2024	1.0	2024
	24	184	4416	1.0	4416
Women's Restroom	2	150I		1.0	150
Men's Restroom	2	150I		1.0	150

ROOM	NO. OF FIXTURES	WATTS/FIXTURE	TOTAL WATTS	U.F.	ADJ. WATTS
Youth Court	6	184	1104	1.0	1104
	4	184	736	1.0	736
	2	194	368	1.0	368
	3	184	552	1.0	552
	4	184	736	1.0	736
Decorative 3rd Floor					
	26	60I	1560	1.0	1560
	12	60I	1200	1.0	1200
Judge Green	2	120I	240	1.0	240
	4	46	184	1.0	184
	8	96	768	1.0	768
Clerk of Court					
	16	184	2944	1.0	2944
Justice Court	18	184	3312	1.0	3312
	7	184	1288	1.0	1288
3rd Floor Restrooms	4	87	348	1.0	348
	4	184	736	1.0	736
2nd Floor Hall	17	75I	1275	1.0	1275
Courtroom #1	29	92	2668	0	0
Courtroom # 2	18	92	1656	0	0
Attorneys	18	164	2952	1.0	2952
	12	164	1968	1.0	1968
	10	75I	750	1.0	750
New Side Stairwell	4				
2nd Floor Hallways	13	184	2392	1.0	2392
Drivers	5	92	460	1.0	460
Assessor	60	184	11040	1.0	11040
Motor Vehicle	20	184	3680	1.0	3680
Restrooms	4	92	368	1.0	368
Assessor	4	60	240	1.0	240

ROOM	NO. OF FIXTURES	WATTS/FIXTURE	TOTAL WATTS	U.F.	ADJ. WATTS
Courtrrom # 3	17	184	3128	.25	782
Courtroom #1	16	92	1472	.25	368
	20	75 I	1500	.0	0
Hallway	3	75 I	225	1.0	225
Jail					
Block 1	7	184	1288	1.0	1288
Catwalk	4	92	368	1.0	368
Block 2	6	162	972	1.0	972
	2	184	368	1.0	368
Footlights	8	75 I	600	1.0	600
Counsel Area	2	100 I	200	1.0	200
Access Hallway	10	184	1840	1.0	1840
Block 3	2	184	368	1.0	368
Block 3	3	24	72	1.0	72
Block 3	4	15 I	60	1.0	60
Block 4	2	184	368	1.0	368
Block 4	3	24	72	1.0	72
Block 4	4	15 I	60	1.0	60
Catwalk	4	162	648	1.0	648
Isolation Cells	1	184	184	1.0	184
Isolation Cells	5	150 I	900	.5	450
Rec Room	4	184	736	.5	368
Trustee quarters	6	184	1104	1.0	552
Block 7	1	184	184	1.0	184
Block 7	2	30 I	60	1.0	60
Hallways	12	184	2208	1.0	2208
Block 5	1	184	184	1.0	184
Block 5	4	23	96	1.0	96
Laundry	1	184	184	1.0	184
Block 6	1	184	184	1.0	184
Block 6	2	30 I	60	1.0	60
Hallway	2	184	368	1.0	368
Central Stores	10	184	1840	1.0	1840
	3	184	552	1.0	552
Microfilm	3	92	460	1.0	460
	12	184	2208	1.0	2208
Hallway	13	92	1196	1.0	1196
General Service	6	184	1104	1.0	1104
	6	184	1104	1.0	1104
	6	184	1104	1.0	1104
DES	4	92	368	1.0	368
Data Processing	16	184	2944	1.0	2944
	1 I	52	52	1.0	52
	1 I	67	67	1.0	67
	16	184	2944	1.0	2944
	16	184	2944	1.0	2944
Exit Lights	10	30	300	1.0	300
	6	92	552	1.0	552
911					
	1	40	40	0	0
	7	184	1288	1.0	1288

EXHIBIT D

MISSOULA COUNTY COURTHOUSE

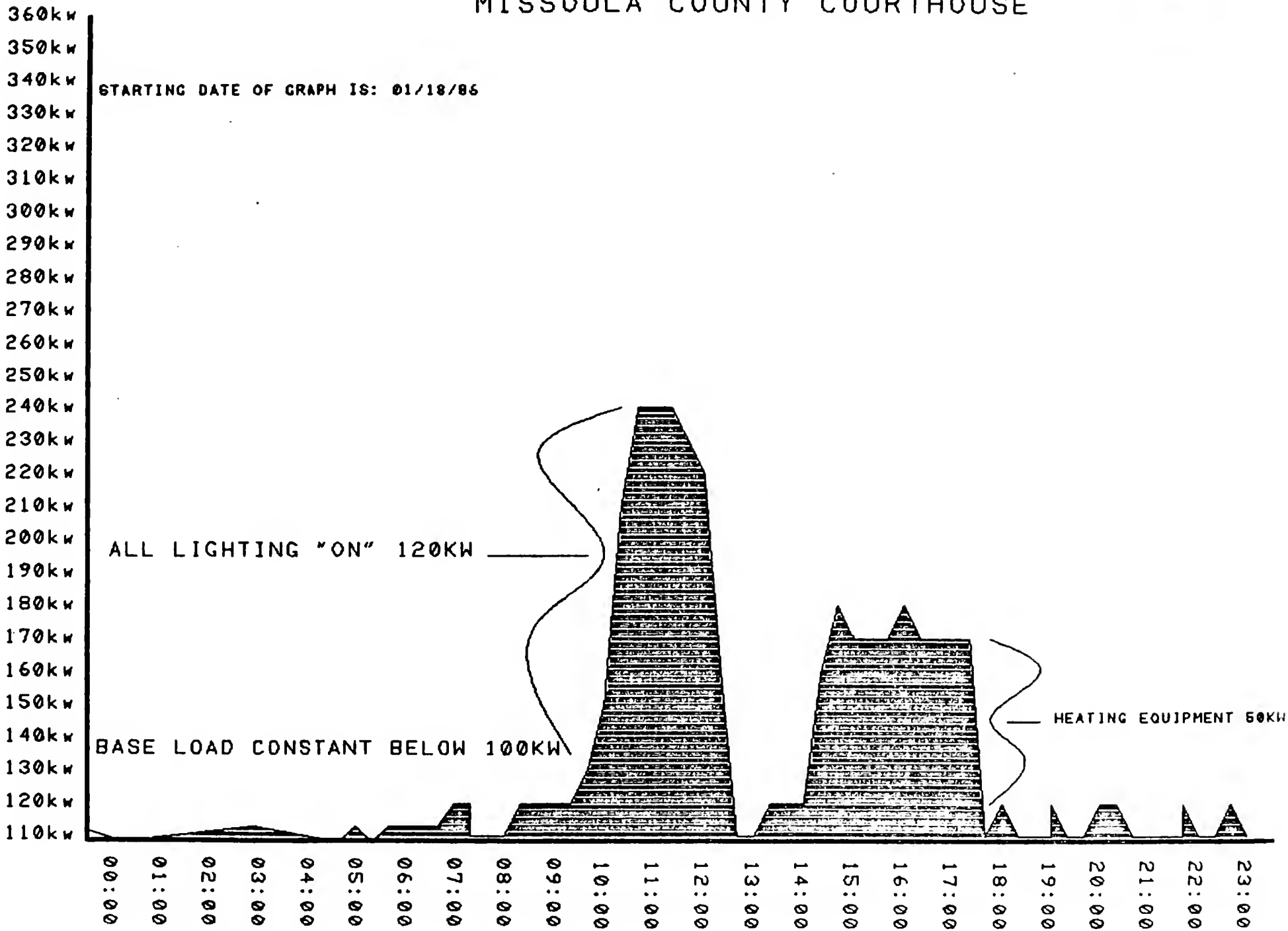
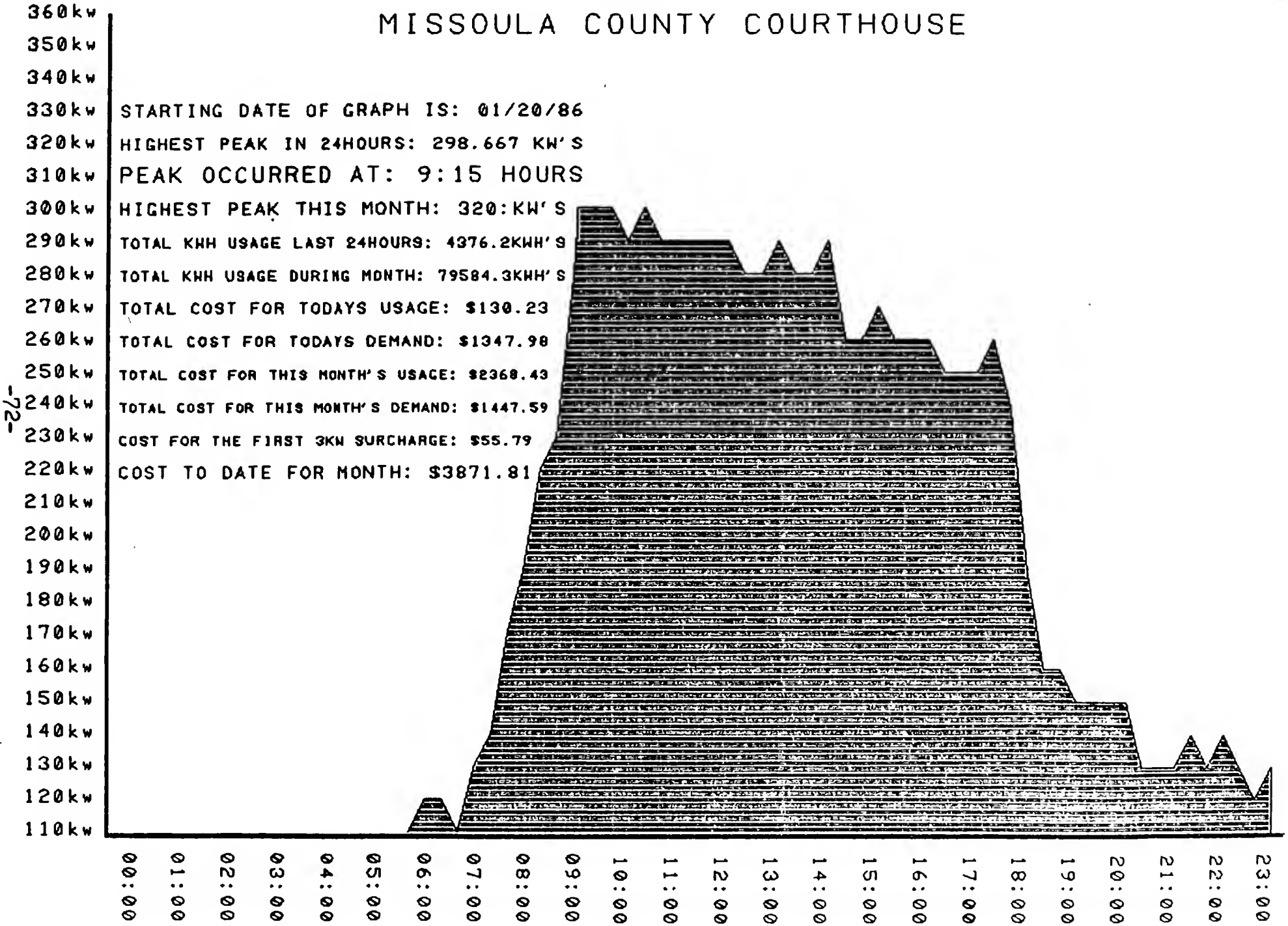


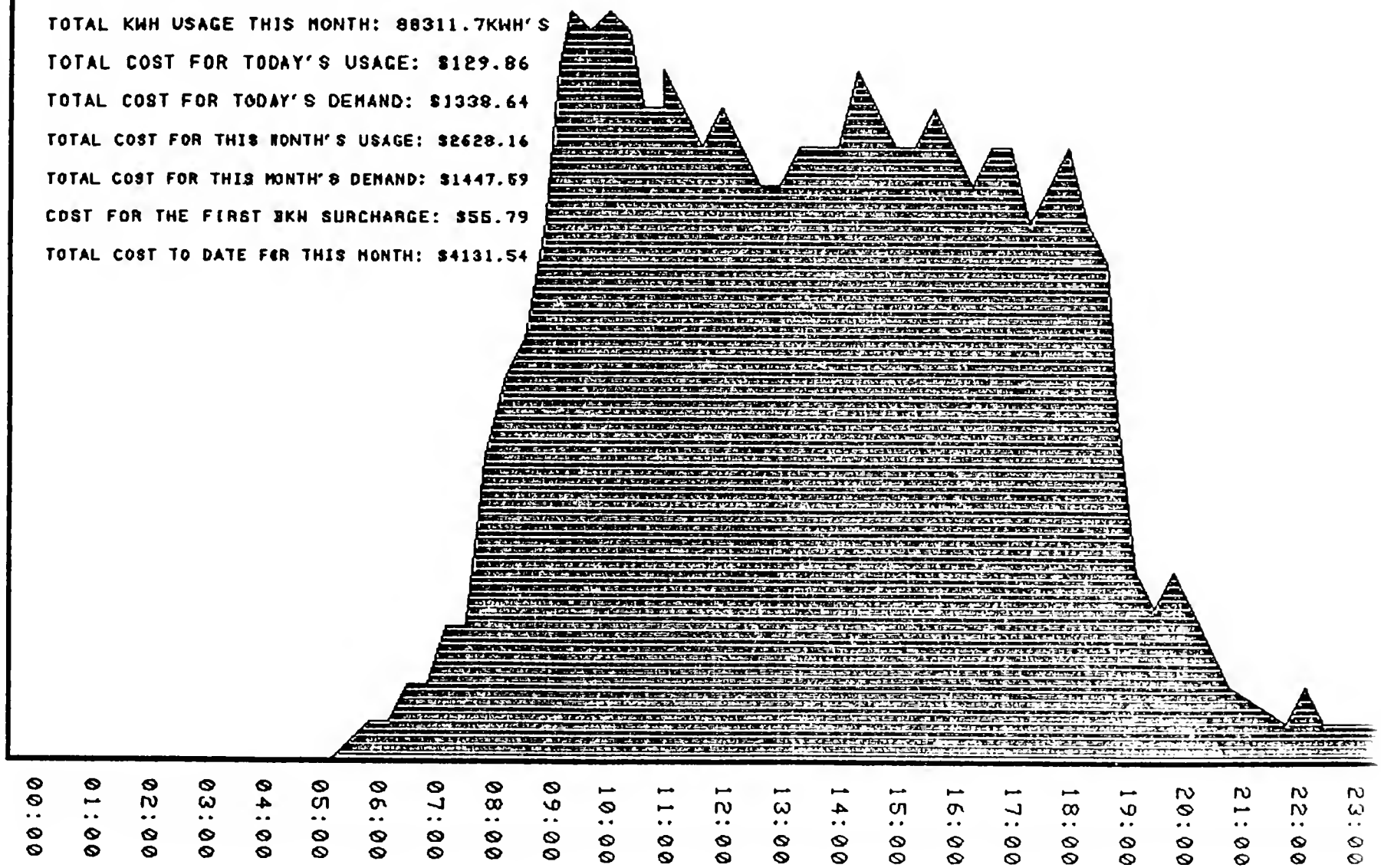
EXHIBIT E

MISSOULA COUNTY COURTHOUSE



MISSOULA COUNTY COURTHOUSE

STARTING DATE OF GRAPH IS: 01/21/86
HIGHEST PEAK IN 24HOURS: 296.667KW'S
PEAK OCCURRED AT: 9:00HOURS
HIGHEST PEAK THIS MONTH: 320.00KW'S
TOTAL KWH USAGE LAST 24 HOURS: 4363.7KWH'S
TOTAL KWH USAGE THIS MONTH: 88311.7KWH'S
TOTAL COST FOR TODAY'S USAGE: $129.86
TOTAL COST FOR TODAY'S DEMAND: $1338.64
TOTAL COST FOR THIS MONTH'S USAGE: $2628.16
TOTAL COST FOR THIS MONTH'S DEMAND: $1447.59
COST FOR THE FIRST 8KW SURCHARGE: $55.79
TOTAL COST TO DATE FOR THIS MONTH: $4131.54



APPENDIX II

EXHIBITS REFERENCED IN THE SECOND QUARTERLY REPORT

EXHIBIT A

DESCRIPTION	NO.	HP/WATTS	TOTAL WATTS	U.F.	ADJ. WATTS	
Major Equipment						
Annex Basement Chiller	1	7580	7580	.5	3790	1
Air Handling Unit	1	1860	1860	1.0	1860	2
Fan #4	1	390	390	1.0	390	2
AHU #5	1	1200	1200	1.0	1200	2
Roof Exhaust #2 Kitchen	1	350	350	1.0	350	1
Exhaust Fan #6 Cancelled	1	690	690	1.0	690	1
AHU #2	1	4200	4200	1.0	4200	2
Fan # 3	1	850	850	1.0	850	2
AHU # 3	1	3510	3510	1.0	3510	2
Fan #2	1	840	840	1.0	840	2
AHU # 1	1	1900	1900	1.0	1900	2
Fan #1	1	1140	1140	1.0	1140	2
Jail Fan	1	3800	3800	1.0	3800	1
Temp Control Pump	1	620	620	.75	465	1
Boiler Feed Pumps	1	800	800	1.0	800	1
Roof Exhaust	4	130	130	1.0	130	1
Air Filter	4	60	240	1.0	240	1
Roof Exhaust	1	220	220	1.0	220	1
Basement heaters	1	60,000	60,000	.2	12,000	2
Elevator #1	1	7500	7500	.5	3750	1
Elevator #2	1	7700	7700	.5	3850	1
Elevator #3	1	3000	3000	.5	1500	1
911 Center	1	6000	6000	1.0	6000	1
911 A.C.	1	9830	9830	1.0	9830	1
Mainframe	1	10520	10520	1.0	10520	1
Air Conditioning	1	11830	11830	1.0	11830	1
Heat Pumps	40	2400	96,000	.20	19,200	2
Heat Pumps	22	3600	79,200	.20	15,840	2

EXHIBIT B

ON TIMES —
OFF TIMES *

AHU #1
7:00 —
7:40 *
8:00 —
8:40 *
9:00 —
9:40 *
10:00 —
10:40 *
11:00 —
REPEAT TO 4:40 - OFF FOR DAY

AHU #2
7:20 —
8:00 *
8:20 —
9:00 *
9:20 —
10:00 *
10:20 —
11:00 —
REPEAT TO 5:00 - OFF FOR DAY

AHU #3
7:40 —
8:20 *
8:40 —
9:20 *
9:40 —
10:20 *
10:40 —
11:20 *
11:40 —
12:20 —
REPEAT TO 5:00 OFF FOR DAY

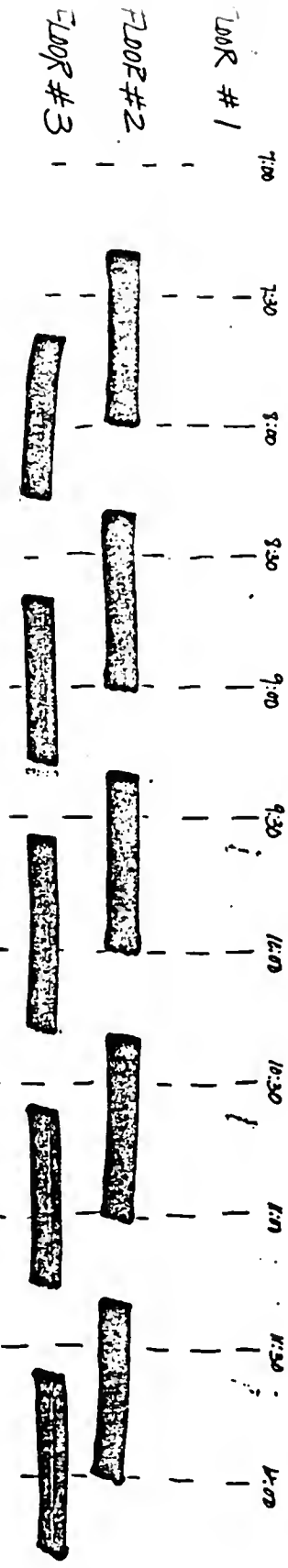


EXHIBIT C

MISCELLANEOUS EQUIPMENT INVENTORY

DESCRIPTION	NO.	HP/WATTS	TOTAL WATTS	U.F.	ADJ. WATTS	
Commissioners						*
Beehive Computers	3	55	165	1.0	165	1
Typewriters	5	100	500	3.8	400	1
Computer & printer	1	240	240	1.0	240	1
Printer	1	125	125	.25	32	1
Tape Recorder	1	25	25	.0	0	
Air Cleaner	1	50	50	1.0	25	6
Air Cleaner	1	25	25	1.0	25	6
Coffee Pot	1	800	800	1.0	800	5
Stereo	1	65	65	0	0	
Coffee Pot	1	600	600	1.0	600	5
Coffee Pot	1	1050	1050	1.0	1050	5
Refrigerator	1	40	40	.5	20	6
Space Heater	3	1500	4500	1.0	4500	4
Space Heater	2	300	600	1.0	600	4
Ionizer	1	50	50	1.0	50	6
Portavac	1	120	120	.0	0	
Adding Machine	2	200	400	.0	0	
Copier	1	1000	1000	.6	500	3
					(9,032)	
201						
Microphones				0	0	
Elections						
Beehive	1	55 W	55	1.0	55	1
Typewriters	2	100	200	1.0	200	1
Adding Machine	1	200	200	.0	0	
Election Machines	3			.0	0	
Pencil Sharpener	1	100	100	.0	0	
Radio	1	6	6	1.0	6	6
Coffee Pot	1	1625	1625	1.0	1625	5
					(1,886)	
Clerk and Recorder						
Microfilm Reader/Printer	4	80	320	.25	80	1
Cannon/PC Printer	1	120	120	0	0	
Copy Machine	1	1000	1000	0	0	1
Typewriters	5	100	500	1.0	500	1
Adding Machines	3	200	600	.25	200	1
Beehive Computers	3	55	165	1.0	165	1
Time Recorders	2	4	8	.0	0	
Pencil Sharpener	1	100	100	.0	0	
Large Fans	2	50	100	.0	0	
Small Fan	1	40	40	.0	0	
Coffee Pot	1	1625	1625	1.0	1625	5
					(3,570)	

DESCRIPTION	NO.	HP/WATTS	TOTAL WATTS	U.F.	ADJ. WATTS	
Auditor						*
Beehive	1	55	55	1.	55	1
Printer	1	120	120	0	0	
Typewriters	2	100	200	1.0	200	1
Adding Machines	3	200	600	.25	50	
Check Printer	1	55	55	.0	0	
Radio	2	11	11	1.0	11	6
Coffee Pot	1	1200	1200	1.0	1200	5
					(1,766)	
Employee Lunch Room						
Refrigerator	3	500	1500	.5	750	6
Pop Machine	1	300	300	.5	150	6
					(900)	
Smoking Lunch Room						
Refrigerator	1	300	300	.5	150	6
Microwave	1	600	600	.0	0	
Air Cleaner	1	50	50	1.0	50	6
					(200)	
Accounting						
Beehives	5	55	275	1.0	275	1
Typewriters	5	100	500	1.0	500	1
Adding Machine	6	200	1200	.25	300	1
Printers	1	250	250	.5	125	1
Lamp	1	80	80	.0	0	
Radio	1	16	16	1.0	16	6
Coffee Pot	1	1200	1200	1.0	1200	5
Space Heater	1	1650	1650	1.0	1650	4
Space Heater	1	1500	1500	1.0	1500	4
					(5,566)	
Sheriff						
Chargers	10	150	1500	1.0	1500	6
Typewriter	22	100	2200	1.0	2200	1
Adding Machines	6	200	1200	.25	300	1
Xerox Machine	1	1000	1000	0	0	1
Radio Charger	1	1875	1875	1.0	1875	6
Computer Printer	4	240	960	.25	240	1
Recorder	3	20	60	0	0	
Film Machine	1	3	3	0	0	
Cassette Recorder	1	33	33	0	0	
Paper Dryer	1	7	7	0	0	
Microfilm Viewer	1	80	80	0	0	
Refrigerator	1	500	500	.5	250	6

DESCRIPTION	NO.	HP/WATTS	TOTAL WATTS	U.F.	ADJ. WATTS	*
Sheriff (Continued)						
T.V.	2	50	100	.25	25	6
Temperature Control	1	55	55	.0	0	
Power Supply	1	200	200	1.0	200	6
Photo Machine	1	75	75	0	0	
Drum base	1	15	15	0	0	
Timer	2	7	14	0	0	
Luminator	1	3	3	0	0	
Film Dryer	1	300	300	0	0	
Lights	4	100	400	1.0	400	5
Radio	4	24	24	1.0	24	6
Radio	5	10	50	1.0	50	6
Microwave	1	500	500	1.0	0	
Coffee Pot	1	1480	1480	1.0	1480	5
Fan	3	50	50	.0	0	
Coffee Warmer	1	25	25	1.0	25	5
Shoe Shiner	1			0	0	
Air Cleaners	2	50	50	1.0	50	6
Space Heater	1	1650	1650	1.0	1650	4
Stereo	3	70	210	.25	52	6
Polygraph Machine	1			0	0	
					(11,221)	
3rd Floor Hallway						
Coffee Machine	1	2800	2800	1.0	2800	5
Coke Machine	1	300	300	.5	150	6
					(2,950)	
Justice Court						
Beehives	5	55	165	1.0	165	1
Typewriters	6	100	600	1.0	600	1
Adding Machines	5	200	1000	.25	250	1
Coffee Pot	1	1250	1250	1.0	1250	1
Printer	2	125	250	.25	62	1
Microphones	6					
Recorder	1	7	7	0	0	
Coffee Pot	1	1500	1500	1.0	1500	5
Clock	2	5	10	1.0	10	6
					(4,077)	
3rd Floor Small Room						
Coffee Pots	3	800	2400	1.0	2400	5
Typewriter	1	100	100	1.0	100	1
					(2,500)	

DESCRIPTION	NO.	HP/WATTS	TOTAL WATTS	U.F.	ADJ. WATTS	*
Attorneys						
Typewriters	6	100	600	1.0	600	1
Computers	4	200	800	1.0	800	1
Printers	3	125	375	.25	94	1
Xerox	1	1000	1000	.0	0	1
Refrigerator	1	500	500	.5	250	6
Coffee Pot	1	600	600	1.0	600	5
Coffee Pots	2	1080	2160	1.0	2160	5
Radios/Clocks	3	6	18	1.0	18	6
					(5,522)	
Personnel						
	3	55	165			
Beehive	3	100	300	1.0	165	1
Typewriter	6	200	1200	1.0	300	1
Adding Machine	1	125	125	.25	300	1
Printers	1	1250	1250	.0	0	
Space Heater	2	600	1200	1.0	1250	4
Coffee Pot	2	5	10	1.0	1200	5
Radio	1	625	625	1.0	10	6
Coffee Pot	1	1500	1500	.0	0	
Space Heater				1.0	1500	4
					(4,725)	
Surveyor						
Microfilm Viewer	2	80	160	.25	40	1
Typewriters	3	100	300	1.0	300	1
Adding Machine	2	200	400	.25	100	1
Beehive	3	55	165	1.0	165	1
G.E. Base Station	2	50	100	1.0	100	1
Refrigerator	1	500	500	.25	125	6
Electric Eraser	9	30	270	.25	68	1
Calculator	4	7	28	1.0	28	1
Space Heater	1	1500	1500	1.0	1500	4
Space Heater	1	1850	1850	.5	925	4
Radio	4	6	24	1.0	24	6
Pencil Sharpener	1	100	100	1.0	100	6
Lamps	8	36	288	.5	144	1
Lettering Machine	1	360	360	.5	180	1
Light Table	1	300	300	.0	0	
Coffee Pot	1	575	575	.0	0	
Blueprint Machine	1	4100	4100	1.0	4100	1
Radio Charger	2	4	8	1.0	8	6
Coffee Pot	1	1100	1100	1.0	1100	5
Comptuer/Printer	1	125	125	1.0	125	1
Adding Machine	1	500	500	.25	125	1
					(9,803)	

DESCRIPTION	NO.	HP/WATTS	TOTAL WATTS	U.F.	ADJ. WATTS	*
Youth Court						
Typewriter	2	300	600	1.0	600	1
Adding Machine	2	200	400	.25	100	1
Radio	5	6	30	1.0	30	6
Coffee Pot	1	1500	1500	1.0	1500	5
Computer/Printer	1	250	250	1.0	250	1
Coffee Pot	1	650	650	.0	650	5
Coffee Pot	1	1090	1090	1.0	1090	5
					(4,220)	
Judge Green						
Typewriter		300	300	1.0	300	1
Coffee Pot		600	600	1.0	600	5
Coffee Pot		650	650	1.0	650	5
Overhead Projector				.0	0	
Space Heater		1500	1500	1.0	1500	4
					(3,050)	
Clerk of Court						
Typewriter	14	300	4200	1.0	4200	1
Adding Machine	3	200	600	.25	150	1
Copy Machine	1	1000	1000	0	0	1
Microfilm Viewer	1	800	800	.0	0	
Space Heater	2	1500	3000	1.0	3000	1
Fan	1	40	40	.0	0	
Beehive	1	55	55	1.0	55	1
					(7,905)	
Sandwich Shop						
Refrigerators	2	300	600	1.0	600	6
Microwave	1	500	500	.0	0	
					(600)	
Drivers						
Typewriters	3	100	300	1.0	300	1
Eye Machine	1	12	12	1.0	12	1
Photograph Machine	1	300	300	.5	150	1
T.V.	1	100	100	.0	0	
Fans	1	40	40	0	0	
Space Heater	1	1300	1300	.0	0	
					(462)	

DESCRIPTION	NO.	HP/WATTS	TOTAL WATTS	U.F.	ANN. WATTS	
Motor Vehicles						*
Typewriters	10	100	1000	1.0	1000	1
Adding Machines	12	200	2400	.25	600	1
Space Heater	1	1200	1200	1.0	1200	4
Computer	4	240	960	1.0	960	1
Printer	2	125	250	.5	125	1
Refrigerator	1	500	500	.5	250	6
Xerox	1	1000	1000	0	0	1
Toaster	1	900	900	.0	0	
Popcorn Popper	1	450	450	0	0	
Coffee Pot	3	1200	3600	.5	1800	5
Fan	1	300	300	0	0	
					(7,535)	
Assessor						
Beehives	8	55	440	1.0	440	1
Typewriters	1	100	100	1.0	100	1
Adding Machines	19	200	3800	.25	600	1
Xerox	1	1000	1000	0	0	1
Computer	1	240	240	1.0	240	1
Printers	1	125	125	.5	62	1
Microfilm Viewer	1	80	80	.0	0	
Coffee Pot	4	1080	4320	1.0	4320	5
Radio	1	7	7	1.0	7	6
Clock	1	5	5	1.0	5	1
Space Heater	1	1200	1200	1.0	1200	4
Coffee Pot	2	600	1200	1.0	1200	5
Air Cleaner	1	50	50	1.0	50	6
					(10524)	
Treasurer						
Xerox	1	1000	1000	0	0	1
Adding Machines	18	200	3600	.25	900	1
Beehives	7	55	385	1.0	385	1
Computer	1	240	240	1.0	240	1
Printer	1	125	125	.5	62	1
Typewriter	1	100	700	1.0	700	1
Fan	7	50	250	.0	0	
Microfilm Viewer	5	80	80	.0	0	
	1				(4,187)	
Switchboard						
Typewriter	1	100	100	1.0	100	1
Computer	1	240	240	1.0	240	1
Digital Words	2	50	100	1.0	100	
Fan	1	50	50	0	0	
Coffee Pot	1	850	850	1.0	850	5
					(1,290)	

DESCRIPTION	NO.	HP/WATTS	TOTAL WATTS	U.F.	ADJ. WATTS	*
Courtrooms (3)						
Baseboard Heaters	9	1500	13,500	1.0	13,500	4
Coffee Pots	2 -	1060	2,120	.5	1,060	5
					(14,560)	
Judge Harkin/Wheelis						
Adding Machine	1	200	200	.0	0	
Tape Recorder	2	25	50	.0	0	
Typewriter	2	100	200	1.0	200	1
Coffee Pot	1	800	800	1.0	800	5
Computer/Printer	1	300	300	1.0	300	1
Small Refrigerator	1	300	300	.5	150	6
Hot Choc. Maker	1	800	800	0	0	
Clock	1	7	7	1.0	7	1
					(1,457)	
Judge Henson						
Typewriter	3	100	300	1.0	300	1
Coffee Pot	1	650	650	1.0	650	5
Adding Machine	1	200	200	.0	0	
Computer/Printer	1	300	300	1.0	300	1
Space Heater		1250	1250	1.0	1250	4
Radio		7	7	1.0	7	6
Stenotypes	3	8	24	1.0	24	6
					(2531)	
Jail						
Refrigerator	1	500	500	.5	250	6
Mixer	1	1/3 hp	249	0	0	
Microphone	1	500	500	0	0	
Coffee Pot	1	1995	1995	1.0	1995	5
Coffee Pot	1	1090	1090	0	0	
Coffee Pot	1	1090	1090	1.0	1090	5
Dishwasher	1	600	600	1.0	600	6
Pump	1	3000	3000	1.0	3000	6
Toaster	1	2800	2800	.0	0	
Radio	8	7	56	1.0	56	6
Freezer walk-in	1	1300	1300	1.0	1300	2
Refrigerator "	1	1000	1000	1.0	1000	2
Computer/Printer	1	300	300	1.0	300	1
Typewriter	2	100	200	1.0	200	1
T.V. Cameras	3	27	81	1.0	81	1
Flashlight Charger	2	300	600	1.0	600	6
T.V.'s	12	100	1200	1.0	1200	1
Washers	2	4200	8400	0	0	
Sewing Machine	1	50	50	0	0	
Clocks	6	7	42	1.0	42	1
					(11,714)	

DESCRIPTION	NO.	HP/WATTS	TOTAL WATTS	U.F.	ADJ. WATTS	*
Central Stores						
Computer	2	60	120	1.0	120	1
Beehive	2	55	110	1.0	110	1
Printer	1	154	154	.5	770	1
Typewriter	3	100	300	.5	1500	1
Adding Machine	5	200	1000	.25	250	1
Air Cleaner	1	50	50	1.0	50	6
Radio	1	10	10	1.0	10	6
Postage Equip.			1422			
Scale (large)	1	120	120	.0	0	
Postage Meter (large)	1	60	60	.0	0	
Postage Meter (small)	1	60	60	.0	0	
Small Postage Machine	1	408	408	.0	0	
Main Terminal	1	96	96	.0	0	
Remote Terminal	1	48	48	.0	0	
Parcel Register	1	240	240	.0	0	
Power Stacker	1	360	360	.0	0	
15# Scale	1	30	30	.0	0	
					(2,810)	
Printing						
Master Maker	1	2400	2400	.24	1000	6
Litho	1	1200	1200	1.0	1200	6
Collator	1	870	870	1.0	870	6
Bertha	1	490	490	1.0	490	6
					(3,560)	
Microfilm						
Iron	2	1100	2200	1.0	2200	1
Fan	2	50	100	1.0	0	
Air Cleaner	1	50	50	1.0	50	6
Microfilm Printer	1	410	410	.0	0	
Adding Machine	1	200	200	.0	0	
Microseal	1	65	65	.0	0	
Microfilm	1	65	65	.0	0	
TD 502	1	50	50	.0	0	
Typewriter	11	100	200	1.0	200	1
Filemaster (camera)	1	2 A	250	1.0	250	1
Recordack	1	.5 A	50	.5	25	1
Beehive	1	60	60	1.0	60	1
Film Checker	1	60	60	1.0	60	1
Processor	1	40	40	1.0	40	1
Film Machine	1	15 A	1000	1.0	1000	1
Refrigerator	1	300	300	.5	150	6
Clock	1	10	10	1.0	10	1
					(4,845)	

DESCRIPTION	NO.	HP/WATTS	TOTAL WATTS	U.F.	ADJ. WATTS	*
General Services						
Charger	1	25	25	1.0	25	6
Computer	1	150	150	1.0	150	1
Typewriter	1	100	100	1.0	100	1
Radio	1	14	14	1.0	14	6
Beehive	1	110	110	1.0	110	1
					(399)	
Maintenance Managers						
Recorder	1	50	50	.5	10	1
Lamp	1					
Adding Machine	1	100	100	.0	0	
Printer	1	200	200	.0	0	
Computer	1	150	150	1.0	150	1
Beehive	1	100	100	1.0	100	1
Radio	1	10	10	.0	0	
					(260)	
Conference Room						
Coffee Pot	1	1060	1060	1.0	1060	5
					(1,060)	
DES						
Computer/Printer	1	250	250	1.0	250	1
Typewriter	1	100	100	1.0	100	1
Light Charger	1	50	50	1.0	50	6
T.V.	1	50	50	0	0	
Video Recorder	1	20	20	0	0	
Chargers	1	1000	1000	1.0	1000	6
Adding Machine	1	200	200	.0	0	
					(1,450)	
Records Management						
Typewriter	1	100	100	1.0	100	1
Beehive	1	110	110	1.0	110	1
Microfilm	1	55	55	0	0	
Linear Amps	2	500	1000	0	0	
					(210)	
Data Processing						
Beehive	8	110	880	1.0	880	1
Intercom	1	5	5	1.0	5	1
Decollator	1	1/3 hp	249	.5	124	1
Burster	1	400	400	.5	200	1
Coffee Pot	1	800	800	1.0	800	5
Typewriter	2	100	200	1.0	200	1
Printer (small)	1	100	100	.5	50	1
Radio	1	10	10	0	0	
Burroughs Comp.	1	150	150	1.0	150	1
Adding Machine	2	200	400	.0	0	
Coffee Pot	1	1625	1625	.0	0	
Popcorn Popper	1	1150	1150	0	0	
					(2,409)	

DESCRIPTION	NO.	HP/WATTS	TOTAL WATTS	U.F.	ADJ. WATTS	
Hallways						
Surveillance Equipt	10	150	1500	1.0	1500	2
Water Fountains	4	1000	4000	.2	800	2
					(2,300)	
911						
Oven	1	1000	1000	.0	0	
Microwave	1	500	500	.0	0	
Toaster Oven	1	2000	200	0	0	
Toaster	1	1050	1050		1050	6
Coffee Maker	2	1050	1050	1.0	1050	6
Refrigerator	1	800	800	.5	400	6
Radio	1	10	10	1.0	10	6
Clock	2	5	5	1.0	5	1
Computers	2	110	220	1.0	220	1
					(2,735)	
Major Equipment						
Annex Basement Chiller	1	7580	7580	.5	3790	2
Air Handling Unit	1	1860	1860	1.0	1860	2
Fan #4	1	390	390	1.0	390	2
AHU #5	1	1200	1200	1.0	1200	2
Roof Exhaust #2	1	350	350	1.0	350	2
Exhaust Fan #6	1	690	690	1.0	690	2
AHU #2	1	4200	4200	1.0	4200	2
Fan # 3	1	850	850	1.0	850	2
AHU # 3	1	3510	3510	1.0	3510	2
Fan #2	1	840	840	1.0	840	2
AHU # 1	1	1900	1900	1.0	1900	2
Fan #1	1	1140	1140	1.0	1140	2
Jail Fan	1	3800	3800	1.0	3800	2
Temp Control Pump	1	620	620	.75	465	2
Boiler Feed Pumps	1	800	800	1.0	800	2
Roof Exhaust	4	130	130	1.0	130	2
Air Filter	1	60	240	1.0	240	2
Roof Exhaust	1	220	220	1.0	220	2
Basement heaters	1	60,000	60,000	.2	12,000	2
Elevator #1	1	7500	7500	.5	3750	2
Elevator #2	1	7700	7700	.5	3850	2
Elevator #3	1	3000	3000	.5	1500	2
911 Center	1	6000	6000	1.0	6000	2
911 A.C.	1	9830	9830	1.0	9830	2
Mainframe	1	10520	10520	1.0	10520	2
Air Conditioning	1	11830	11830	1.0	11830	2
					(85,435)	
Heat Pumps					20,000	

NEW SIDE

BASEMENT	
Central Stores	2810
Printing	3560
Microfilm	4045
General Services	399
Maintenance Managers	260
Conference Room	1,060
D.E.S.	1450
Records Management	210
Data Processing	2409
911	3,235
ALL HALLWAYS	2,300
1ST FLOOR	
Sandwich Shop	600
Drivers	462
Motor Vehicles	7535
Assessor	10,524
Treasurer	4187
Switchboard	1290
2ND FLOOR	
Commissioners	9032
Elections	1886
Clerk and Recorder	3570
Auditor	1766
Employee Lunchroom	900
Smoking Lunchroom	200
Accounting	5,566
3rd FLOOR	
Sheriff	11,221
Hallway	2,950
Justice Court	4,077
Small Room	2,500
JAIL	(11,714)

OLD COURTHOUSE

1ST FLOOR	
Personnel	4725
Surveyor	9803
Youth Court	4220
2ND FLOOR	
Attorneys	5,522
Courtrooms (2)	10,060
3RD FLOOR	
Judge Greene	3,050
Clerk of Court	7905
Judges Harkin/Wheelis	1457
Judge Henson	2531
Large Courtroom	4,500
Major Equipment	85,435

EXHIBIT D

Priority A. Essential

1. The building cannto function without it.

2. One office or area's operation is seriouly hampered by the equipment's inoperable state.

3. The County is mandated by law to operate the equipment at this rate or schedule.

Priority B.

1. The machines operating could be adjusted to operate at a different schedule other than 8-5.

2. The machine or equipment could be adjusted to operate less than its present rate (candidate for duty cycle or load shed) with no or little impact on itself or other equipment or on a conditioned space.

Priority C. Non-essential

1. This category includes items such as coffee pots, space heaters, pop machines, candy machines, refrigerators, etc..

Where some of the pieces of equipment fall into the B catetgory due to influencing factors such as cold pockets in the buildings, unreasonably sterile environments and the like, it is certainly not the case with all of them.

Form 43-3

Pul : Service Commission of M ntana

THE MONTANA POWER COMPANY

(Name of Company)

Sheet No. GS-84 Suppl. #5
Cancelling Sheet No. GS-84 Suppl. #4
Page 1 of 2

Schedule GS-84 Suppl. #5

GENERAL ELECTRIC Service

MISSOULA COUNTY

AVAILABLE FOR: All electric service required when supplied through one meter at one point of delivery. Not available for standby, breakdown, resale or shared service, irrigation pumping and sprinkling service, or residential service.

TYPE OF SERVICE: Sixty cycle alternating current at such phase and voltage as the Company may have available.

RATES: Net Monthly Bill:

Monthly Service Charge $3.67

Plus:

Energy ($/kWh):

	First 3,000 kWh	All Additional kWh
Winter:	$0.048357	$0.029760
Summer:	$0.040296	$0.024799

Plus:

Demand ($/kW):

	First 10 kW	All Additional kW
Winter:	No charge	$4.669661
Summer:	No charge	$2.917005

SEASON DEFINITION:

Meter readings beginning with the December billing cycle and ending with the March billing cycle shall be billed at the winter season rate. Meter readings beginning with the April billing cycle and ending with the November billing cycle shall be billed at the summer season rate.

Issued ______ (Date) By Stephen Wait (Signature of Officer of Utility)

Approved 77:266/3 September 16, 1985 (Date)

Docket No. 85.9.37 Interim Order No. 5155

(Space for Stamp or Seal of Commission)

Effective for electric service rendered on and after (Date) Sept. 16, 1985

PUBLIC SERVICE COMMISSION OF MONTANA

Trina Stoffield

Secretary.

*Space below these lines for use of Commission only.

EXHIBIT E

EXHIBIT E

The basis for the developed scenarios were taken from the audit forms. Our base load is between 90kw-130kw. In order to determine the cause of this base load we made the following assuptions based on teh information gathered through the energy audit. It is our estimate that the jail facility is using a constant 25kw. This is broken down into lights, surveilance equipment, kitchen equipment, exhaust fans, elevator and walk-in cooler and freezer. The 9-1-1 center is also a constant load for the building. The 9-1-1 consoles add 6kw and misc. equipment add another 1kw. The 9-1-1 A.C. units add 9.8kw and the surveilance equipment in the building adds another constant 1.5kw. The data processing center adds a constant 10.5kw. The air conditioning units for the computer room add 12kw. The base load is then supplemented by the mechanical equipment which operates more frequently on cold nights and weekends as well as the misc. equipment which is left plugged in all the time. The break down of this base load is as follows:

Jail	25-30kw
9-1-1	17kw
DP	22.5kw
Surveiliance	1.5kw
Mechanical Equip.	15kw
Misc. Equip.	10-30kw
Total Est.	91-116kw

SCENARIO #1 (SEE ATTACHED 2/13/86 GRAPH)

PEAK DEMAND 333KW 9:00AM 2/13/86

1) OFFICE EQUIPMENT	47
2) MECHANICAL EQUIPMENT EQUIPMENT PRIORITY A 107KW OR 32%	94
3) LIGHTING EQUIPMENT PRIORITY B 147KW OR 44%	113
4) SPACE HEATERS EQUIPMENT PRIORITY C 76KW OR 23%	13
5) COFFEE POTS	33
6) MISC. EQUIPMENT	12

MISSOULA COUNTY COURTHOUSE

STARTING DATE OF GRAPH IS: 02/13/86

HIGHEST PEAK OCCURRED DURING 24HOURS: 333.333KW'S

PEAK OCCURRED AT: 10:30HOURS

HIGHEST PEAK THIS MONTH: 316.000KW'S

TOTAL KWH USAGE DURING LAST 24HOURS: 5248.8KWH'S

TOTAL KWH USAGE DURING THIS MONTH: 51549.1KWH'S

TOTAL COST FOR TODAY'S USAGE: $156.21

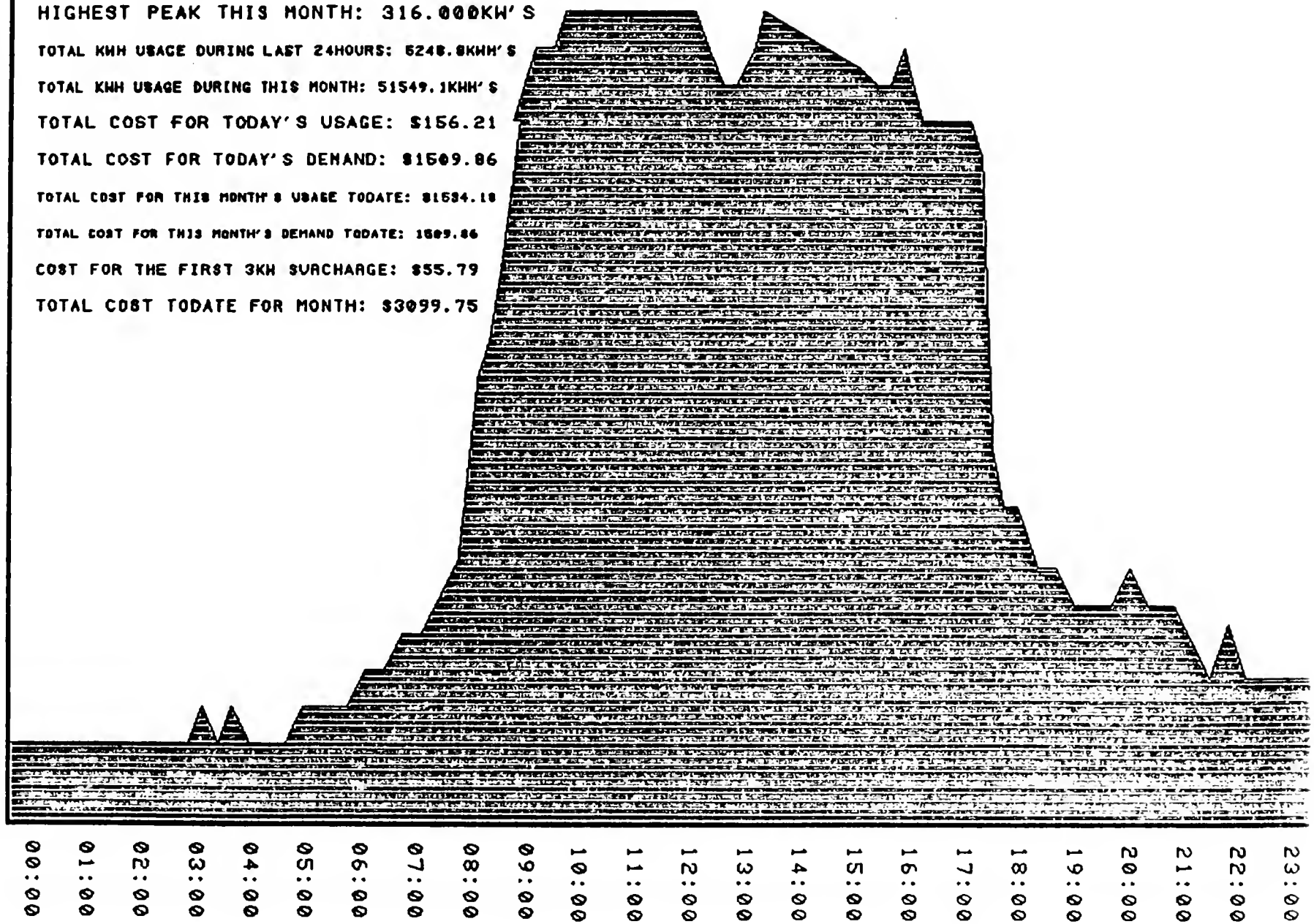
TOTAL COST FOR TODAY'S DEMAND: $1509.86

TOTAL COST FOR THIS MONTH'S USAGE TODATE: $1534.18

TOTAL COST FOR THIS MONTH'S DEMAND TODATE: 1509.86

COST FOR THE FIRST 3KW SURCHARGE: $55.79

TOTAL COST TODATE FOR MONTH: $3099.75



SCENARIO #2 (SEE ATTACHED 2/20/86 GRAPH)

PEAK DEMAND 322 8:30AM 2/20/86

1) OFFICE EQUIPMENT	45
2) MECHANICAL EQUIPMENT EQUIPMENT PRIORITY A 125KW OR 39%	100
3) LIGHTING EQUIPMENT PRIORITY B 140KW OR 42%	110
4) SPACE HEATERS EQUIPMENT PRIORITY C 57KW OR 17%	20
5) COFFEE POTS	24
6) MISC. EQUIPMENT	13

MISSOULA COUNTY COURTHOUSE

STARTING DATE OF GRAPH IS: 02/20/86

HIGHEST PEAK OCCURRED DURING 24HOURS: 322.000KW'S

PEAK OCCURRED AT: 8:30HOURS

HIGHEST PEAK OCCURRED DURING MONTH: 383.333KW'S

TOTAL KWH USAGE DURING 24HOURS: 4858.0KWH'S

TOTAL KWH USAGE THIS MONTH: 80620.9KWH'S

TOTAL COST FOR TODAY'S USAGE: $144.57

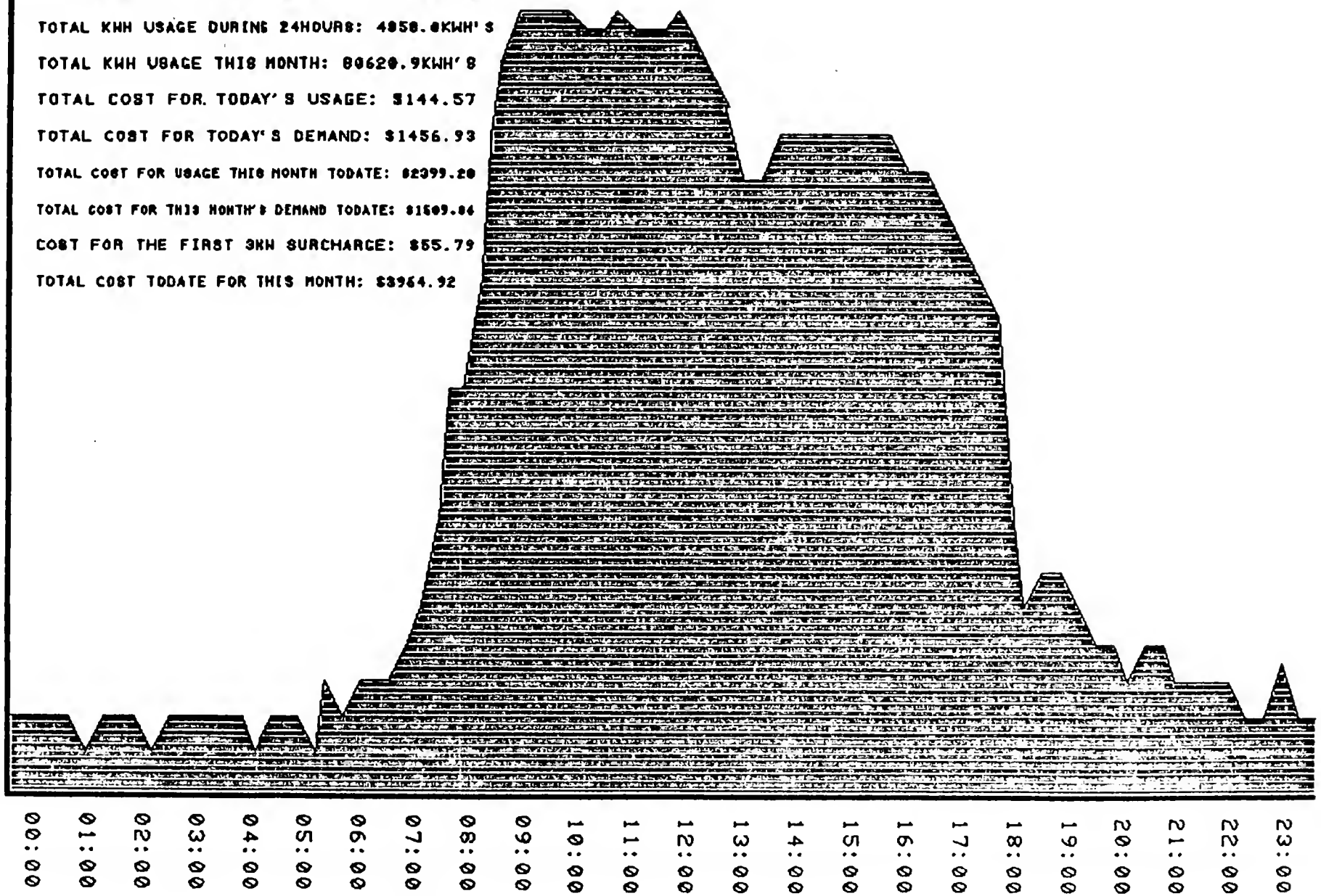
TOTAL COST FOR TODAY'S DEMAND: $1456.93

TOTAL COST FOR USAGE THIS MONTH TODATE: $2399.20

TOTAL COST FOR THIS MONTH'S DEMAND TODATE: $1509.84

COST FOR THE FIRST 3KW SURCHARGE: $55.79

TOTAL COST TODATE FOR THIS MONTH: $3964.92



MISSOULA CITY-COUNTY ENERGY OFFICE

Missoula County Courthouse · Missoula, MT. 59802 · Ph. (406) 721-5700

March 21, 1986
EC-86-02

TO: ALL EMPLOYEES IN THE COURTHOUSE AND COURTHOUSE ANNEX

FROM: LOIS JOST, ENERGY COORDINATOR

RE: COFFEE POT/SPACE HEATER TEST

I hope this will give you enough notice to prepare for this test. On FRIDAY, MARCH 28, please DO NOT USE your coffee pots, space heaters or similar heating devices from 6:30 a.m. to noon.

To ease the shock, The Staircase Deli on the main floor of the Annex will serve coffee (for 10¢) to employees with their own cups. They'll open at 8:30 a.m. on Friday the 28th.

Thank you so much for your cooperation.

LJ/cd

SCENARIO #3 (SEE ATTACHED 3/28/86 GRAPH AND TEST MEMO)

PEAK DEMAND 243 11:00AM 3/28/86

1) OFFICE EQUIPMENT	35
2) MECHANICAL EQUIPMENT EQUIPMENT PRIORITY A 105KW OR 43%	90
3) LIGHTING EQUIPMENT PRIORITY B 105KW OR 49%	100
4) SPACE HEATERS EQUIPMENT PRIORITY C 13KW OR 5%	5
5) COFFEE POTS	0
6) MISC. EQUIPMENT	13

MISSOULA COUNTY COURTHOUSE

STARTING DATE OF GRAPH IS: 03/28/86

HIGHEST PEAT DCCURRED DURING 24HDURS: 243.333KW'S

PEAK OCCURRED AT: 11:00HOURS

TOTAL HIGHEST PEAK OCCURRED DURING THIS MONTH: 291.333KW'S

TOTAL KWH USAGE DURING LAST 24HDURS: 3674.3KWH'S

TOTAL KWH USAGE DURING THIS MONTH: 88787.1KWH'S

TOTAL COST FOR TODAY'S USAGE: $109.35

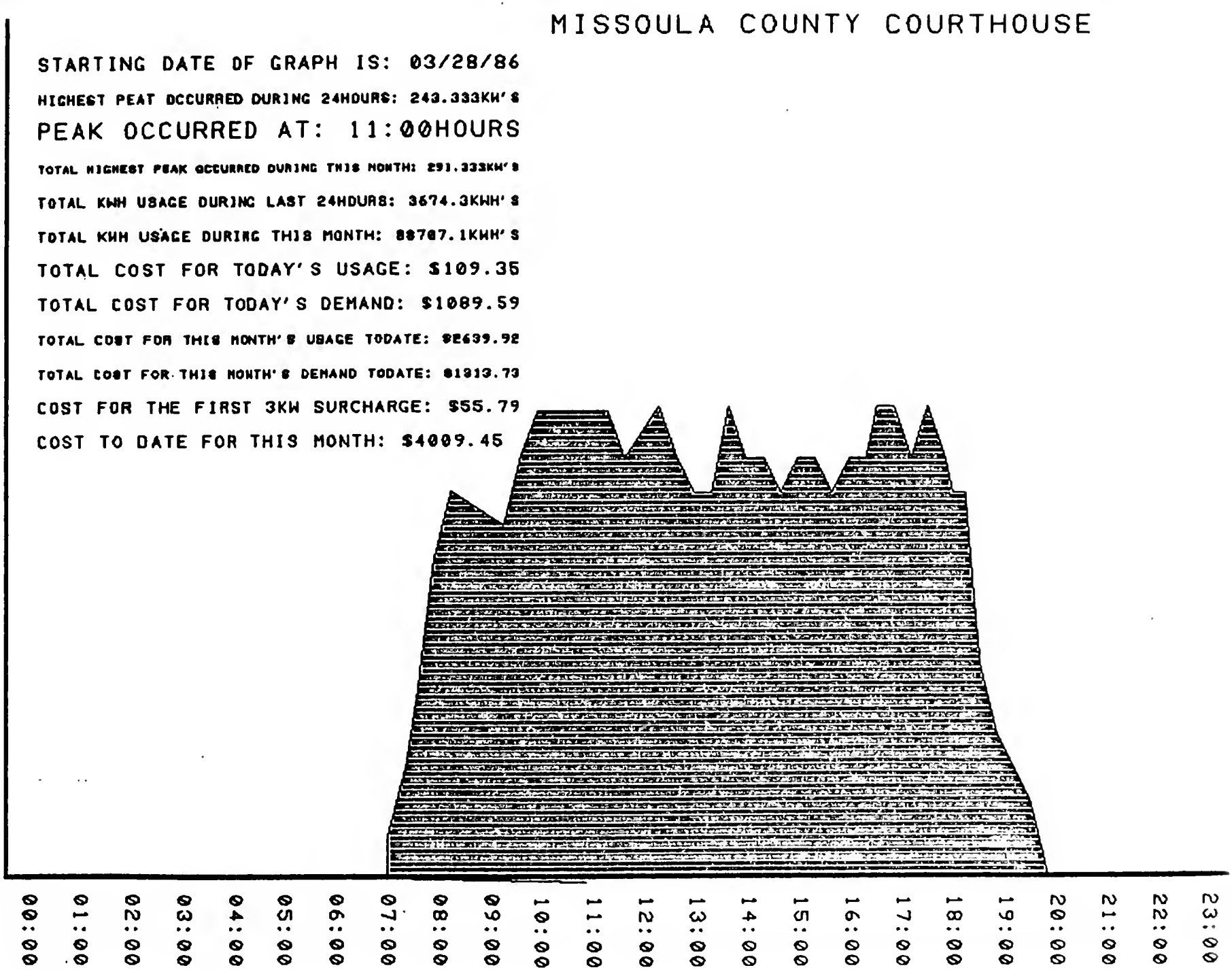
TOTAL COST FOR TODAY'S DEMAND: $1089.59

TOTAL COST FOR THIS MONTH'S USAGE TODATE: $2639.92

TOTAL COST FOR THIS MONTH'S DEMAND TODATE: $1913.73

COST FOR THE FIRST 3KW SURCHARGE: $55.79

COST TO DATE FOR THIS MONTH: $4009.45



APPENDIX III

EXHIBITS REFERENCED IN THE THIRD QUARTERLY REPORT

EXHIBIT A

MISSOULA COUNTY COURTHOUSE

STARTING DATE OF GRAPH IS: 04/07/86

HIGHEST PEAK OCCURRED DURING 24HOURS: 268.800KW'S

PEAK OCCURRED AT: 10:00HOURS

HIGHEST PEAK OCCURRED THIS MONTH: 272.667KW'S

TOTAL KWH USAGE DURING 24HOURS: 3971.0KWH'S

TOTAL KWH USAGE DURIING THIS MONTH: 25130.7KWH'S

TOTAL COST FOR TODAY'S USAGE: $98.48

TOTAL COST FOR TODAY'S DEMAND: $752.59

TOTAL COST FOR THIS MONTH'S USAGE TODATE: $623.22

TOTAL COST FOR THIS MONTH'S DEMAND TODATE: $766.20

COST FOR THE FIRST 3KW SURCHARGE: $46.49

TOTAL COST TO DATE FOR THIS MONTH: $1435.91

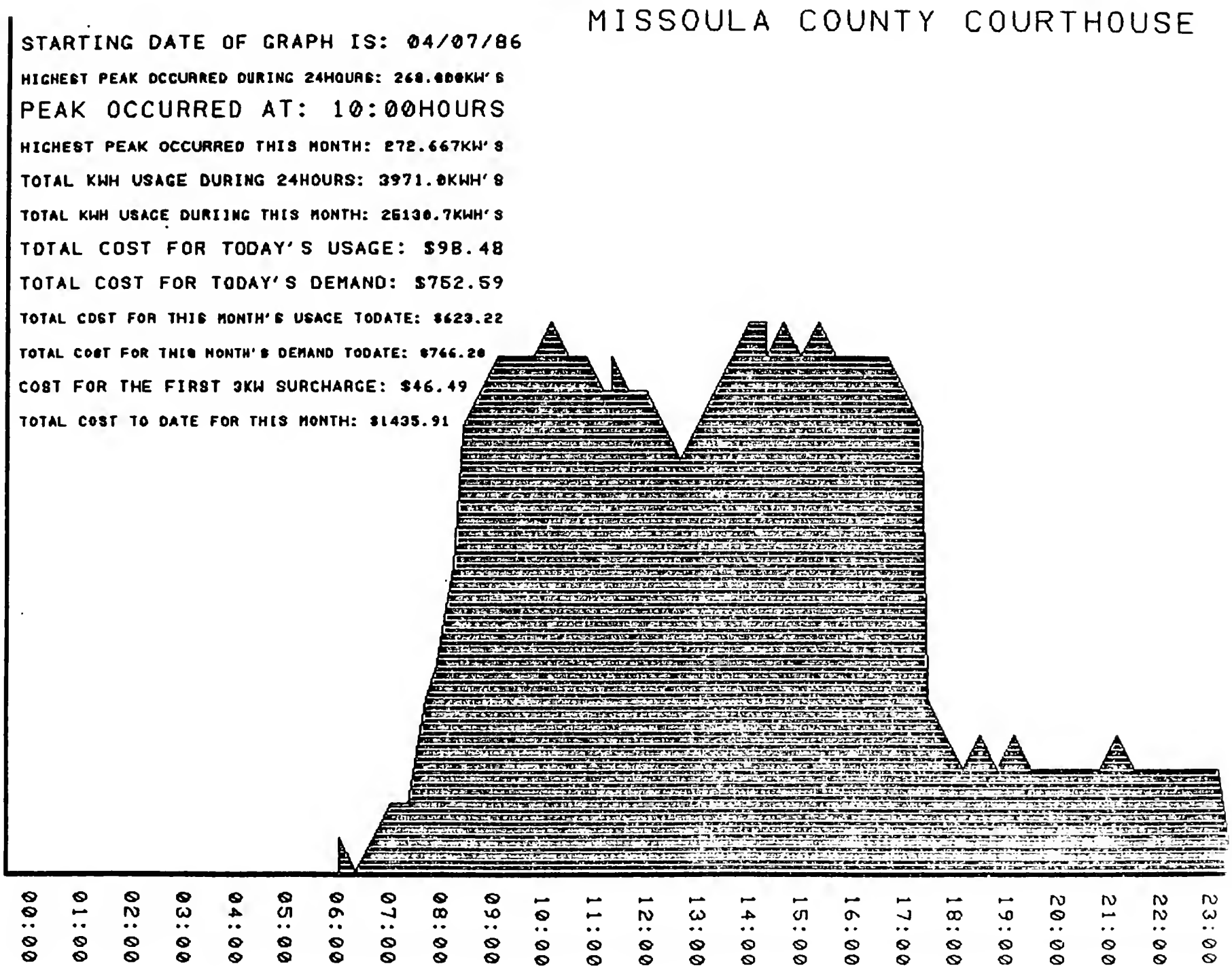


EXHIBIT B

RESOLUTION NO._____

WHEREAS, the Courty Courthouse has undertaken major work on the heating and air handling systems; and

WHEREAS, this work will create a greater overall comfort level and more even heat distribution; and

WHEREAS, maintaining the temperatures between 68-72 degrees in the winter and 76-80 degrees in the summer is reasonable for comfort of the employees; and

WHEREAS, maintaining the temperature at these levels reduces our gas consumption by 8-20% over a 75 degree set point;

NOW, THEREFORE, BE IT RESOLVED that a temperature policy be established which maintains the building comfort levels between 68-72 degrees in the winter and 76-80 degrees in the summer.

DATED, THIS_____DAY OF_____,1986

BOARD OF COUNTY COMMISSIONERS

_____
Barbara Evans, Chairman

_____
Ann Mary Dussault, Commissioner

_____
Janet Stevens, Commissioner

MISSOULA COUNTY
BOARD OF COUNTY COMMISSIONERS
• Missoula County Courthouse • Missoula, Montana 59802
(406) 721-5700

BCC-86-234
May 20, 1986

TO: ALL DEPARTMENT HEADS AND EMPLOYEES IN THE COURTHOUSE AND ANNEX

FROM: BOARD OF COUNTY COMMISSIONERS

RE: SPACE HEATERS

As you know, the County has taken an active role in energy conservation over the past several years. As part of our overall plan for conservation and comfort in the building, Lois Jost and the Employees Energy Committee recommends that all space heaters now in use in the building be removed. We support this proposal.

Although major work is now underway on the heating system, we understand that cold pockets may still exist upon the project's completion. Therefore, each Department will be issued an Aztec radiant desk heater. These will be the only units allowed in the building for a number of reasons. The Aztec unit is designed without an exposed heating element, which virtually eliminates any fire hazard potential, and secondly, the units require 1/5 of the electricity of the standard units now in use. We would also request that all employees use their discretion when using any electrically heated units in the building.

Thank you for your immediate attention to this matter. County I.D. units should be returned to General Services.

BOARD OF COUNTY COMMISSIONERS

DRAFT

Barbara Evans, Chairman

Ann Mary Dussault, Commissioner

BCC/LJ:ss

Janet Stevens, Commissioner

EXHIBIT C

ENERGY CONSUMPTION FILE

FACILITY COUNTY COURTHOUSE
ADDRESS 230 W. BROADWAY
MISSOULA MT 59802

ACCOUNT NO. 96417002
AREA OF BUILDING 84000 SQ.FT.
BASE TEMPERATURE 55 °F.
COOLING DDAYS INCLUDED Y

DATES 840501 - 850509

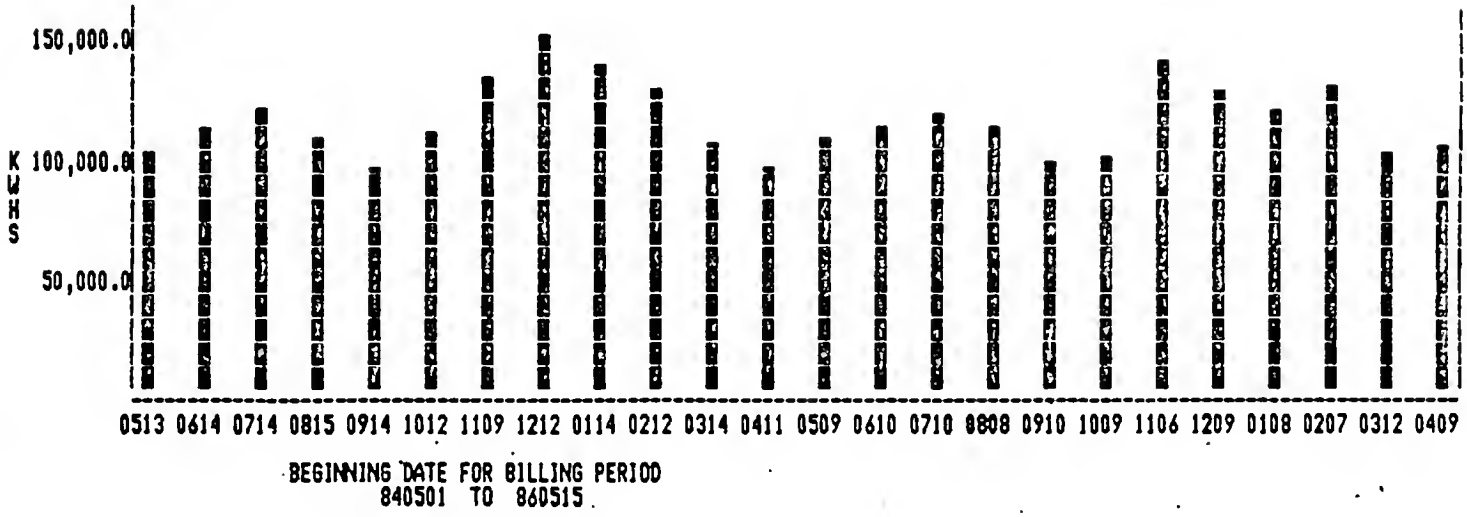
					DOLLAR COST				E.U.I.			BTU/SF/MONTH		
BEG. DATE	KWH	KW	MCF	DD	KWH	KW	GAS	TOTAL	EL.	GAS	TOT.	ELECT.	GAS	TOTAL
840513	100600	302	180	176	1775.56	793.71	824.40	3393.67	23.2	12.2	35.4	4086	2143	6229
840614	110000	250	117	229	1936.47	652.36	535.86	3124.69	19.5	6.1	25.6	4468	1393	5861
840714	119000	320	81	484	2090.53	842.63	370.98	3304.14	10.0	2.0	12.0	4834	964	5798
840815	105000	304	130	274	1850.88	799.14	595.40	3245.42	15.6	5.6	21.2	4265	1548	5813
840914	94000	284	354	191	1662.58	744.78	1621.32	4028.68	20.0	22.1	42.1	3818	4214	8032
841012	108400	300	564	512	2290.94	1182.48	2583.12	6056.47	8.6	13.1	21.7	4403	6714	11117
841109	130720	320	830	865	2749.44	1263.95	3801.40	7814.79	6.1	11.4	17.6	5310	9881	15191
841212	149480	326	948	1198	3133.16	1288.41	4324.67	8746.24	5.1	9.4	14.5	6068	11286	17354
850114	136000	326	859	1047	3756.26	1350.87	3542.87	8650.00	5.3	9.8	15.0	5524	10226	15750
850212	126800	320	622	702	3505.62	1325.22	2562.17	7393.00	7.3	10.5	17.9	5150	7405	12555
850314	103000	298	431	359	2380.87	769.08	1783.48	4933.43	11.7	14.3	25.9	4184	5131	9315
850411	94000	280	275	214	2176.55	721.01	1137.95	4035.51	17.8	15.3	33.1	3818	3274	7092
YEARLY	1376920		5391	6251	29308.90	11733.60	23683.60	64726.00	8.9	10.3	19.2	55929	64179	120108

DATES 850501 - 860515

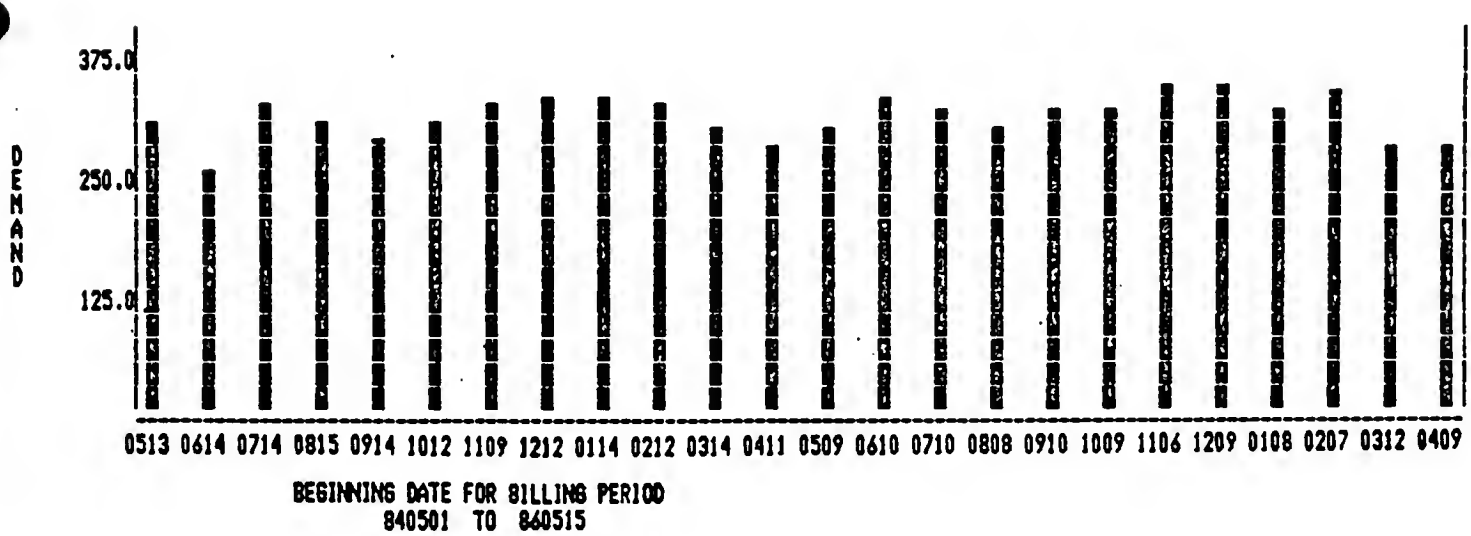
					DOLLAR COST				E.U.I.			BTU/SF/MONTH		
BEG. DATE	KWH	KW	MCF	DD	KWH	KW	GAS	TOTAL	EL.	GAS	TOT.	ELECT.	GAS	TOTAL
850509	106000	298	237	211	2448.98	769.08	980.71	4198.76	20.4	13.4	33.8	4306	2821	7127
850610	111800	326	148	392	2584.02	843.85	612.42	4040.29	11.6	4.5	16.1	4541	1762	6303
850710	115800	318	72	502	2855.20	877.80	297.94	4030.94	9.4	1.7	11.1	4704	857	5561
850808	111600	298	260	184	2753.43	820.80	1075.88	4650.11	24.6	16.8	41.5	4533	3095	7628
850910	97000	314	380	283	2455.66	886.77	1572.44	4914.87	13.9	16.0	29.9	3940	4524	8464
851009	98800	318	408	390	2500.30	898.44	1688.30	5087.04	10.3	12.5	22.7	4013	4857	8870
851106	138200	338	1015	1238	4172.29	1531.65	4200.07	9904.01	4.5	9.8	14.3	5614	12083	17697
851209	125200	338	855	1166	3785.41	1531.65	3526.32	8843.38	4.4	8.7	13.1	5086	10179	15264
860108	119000	316	707	798	3600.90	1428.92	2913.90	7943.71	6.1	10.5	16.6	4834	8417	13250
860207	129000	336	764	751	3898.50	1522.31	3149.76	8570.57	7.0	12.1	19.1	5240	9095	14335
860312	101000	288	461	331	2554.86	787.59	1866.24	5208.69	12.4	16.2	28.6	4103	5369	9472
860409	104200	280	400	319	2634.22	787.59	1655.20	5077.01	13.3	14.9	28.2	4233	4762	8994
YEARLY	1357600		5697	6565	36243.80	12686.40	23539.20	72469.40	8.4	10.3	18.7	55144	67821	122966

COUNTY COURTHOUSE
230 W. BROADWAY
MISSOULA MT 59802

ELECTRIC USE PER MONTH (KWH)

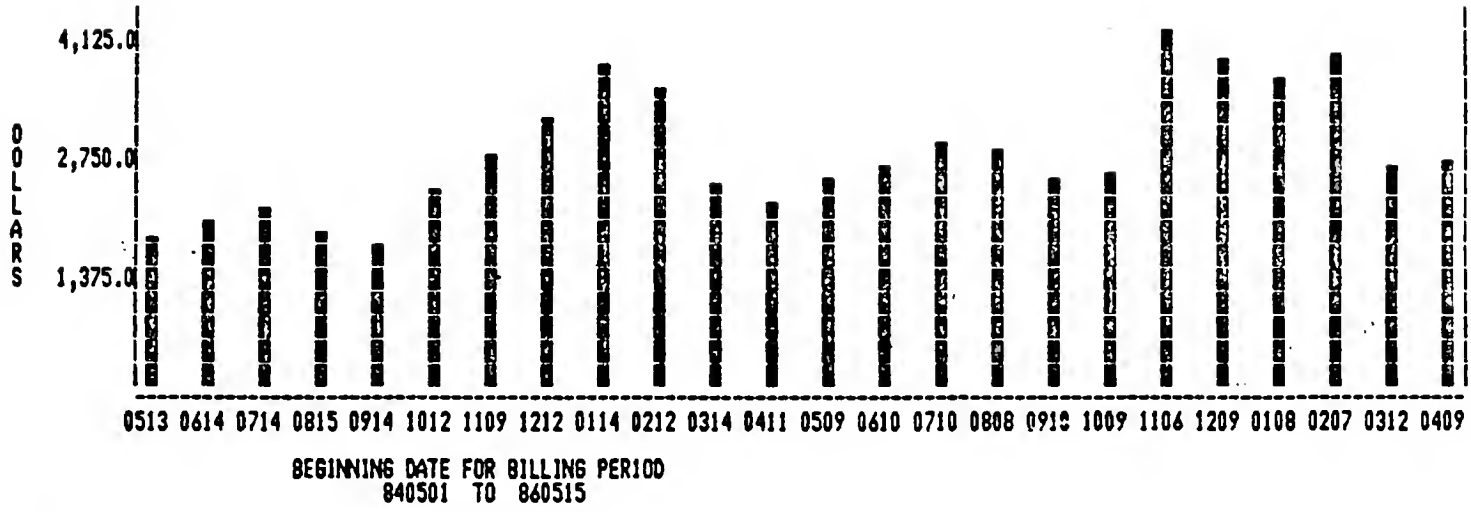


KILOWATT DEMAND PER MONTH

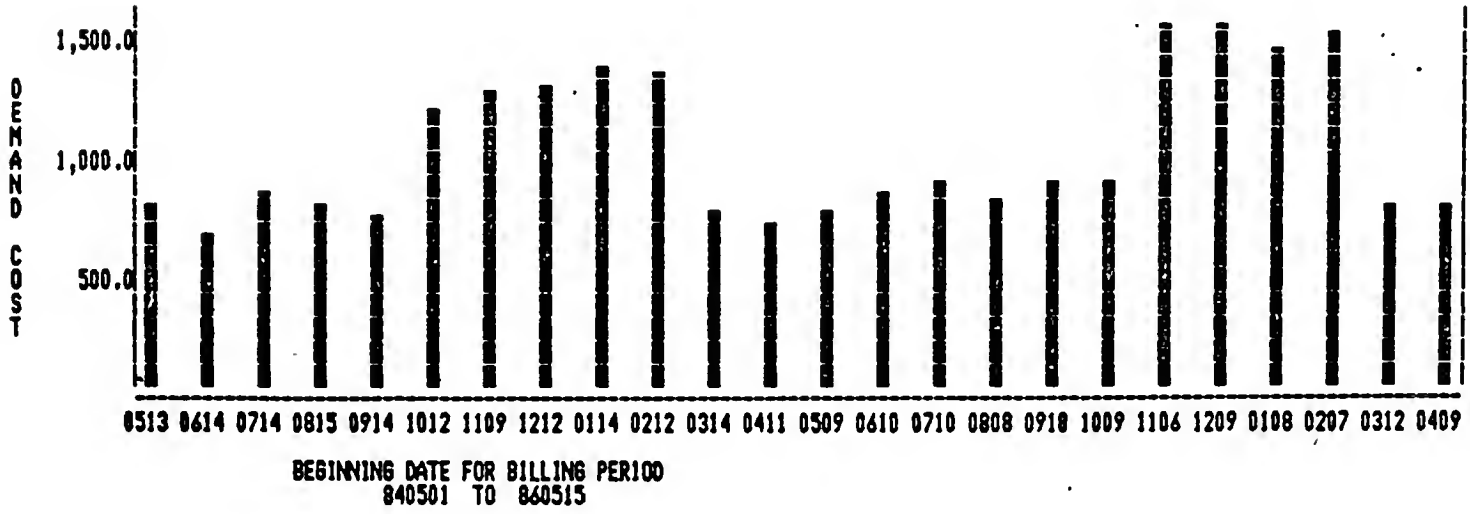


COUNTY COURTHOUSE
230 W. BROADWAY
MISSOULA MT 59802

KILOWATT-HOUR COST PER MONTH

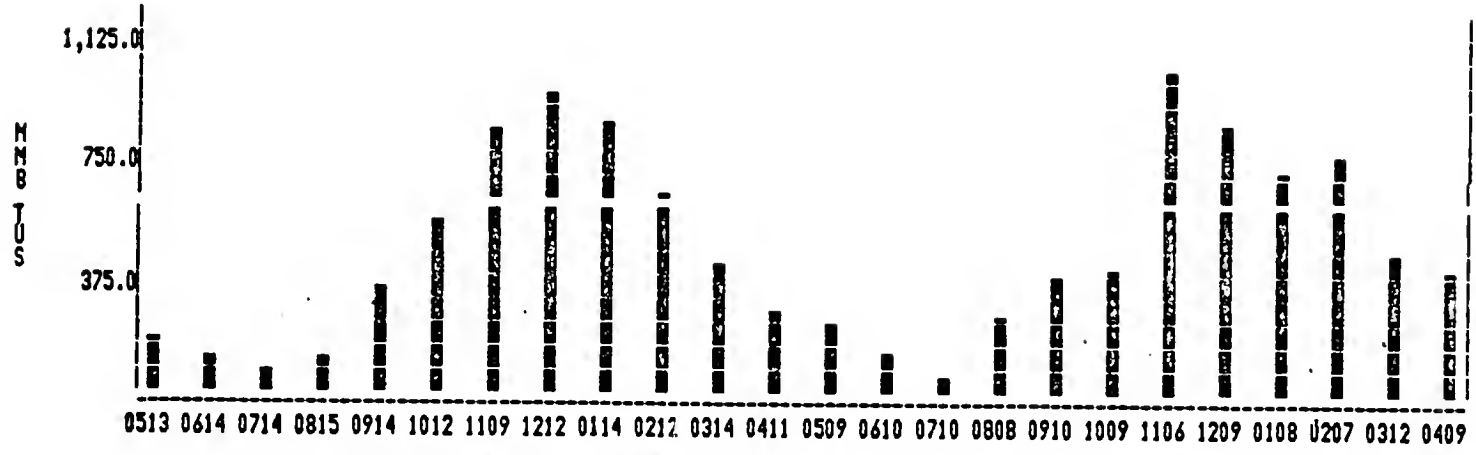


DEMAND COST PER MONTH

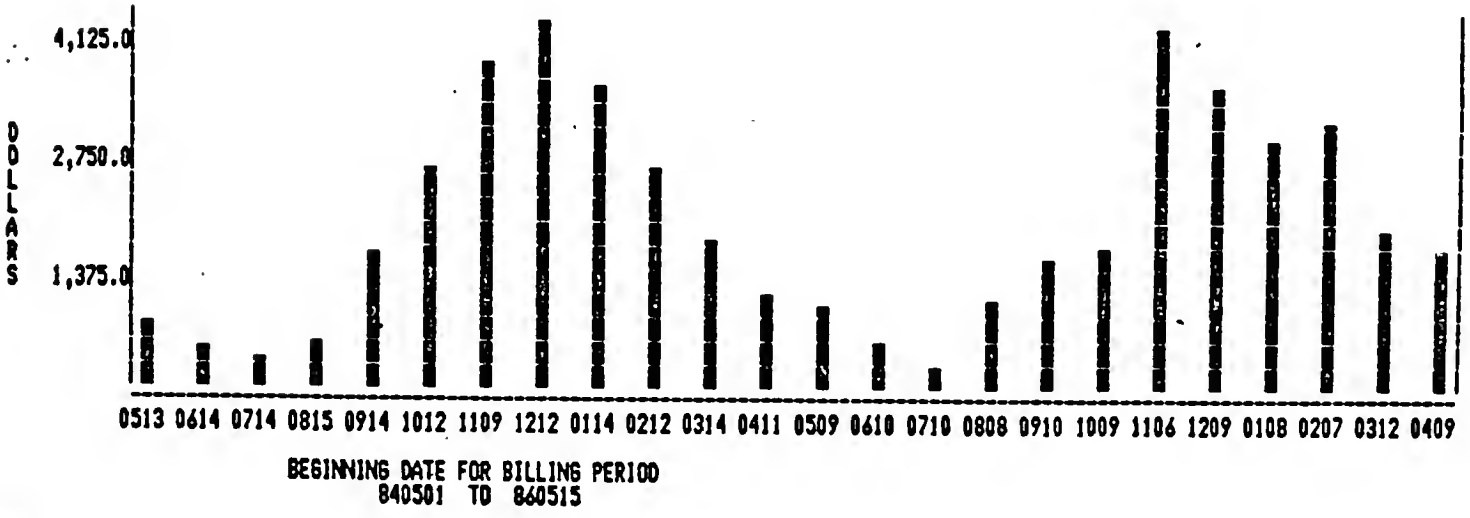


COUNTY COURTHOUSE
230 W. BROADWAY
MISSOULA MT 59802

GAS USE PER MONTH (MMBTU'S)

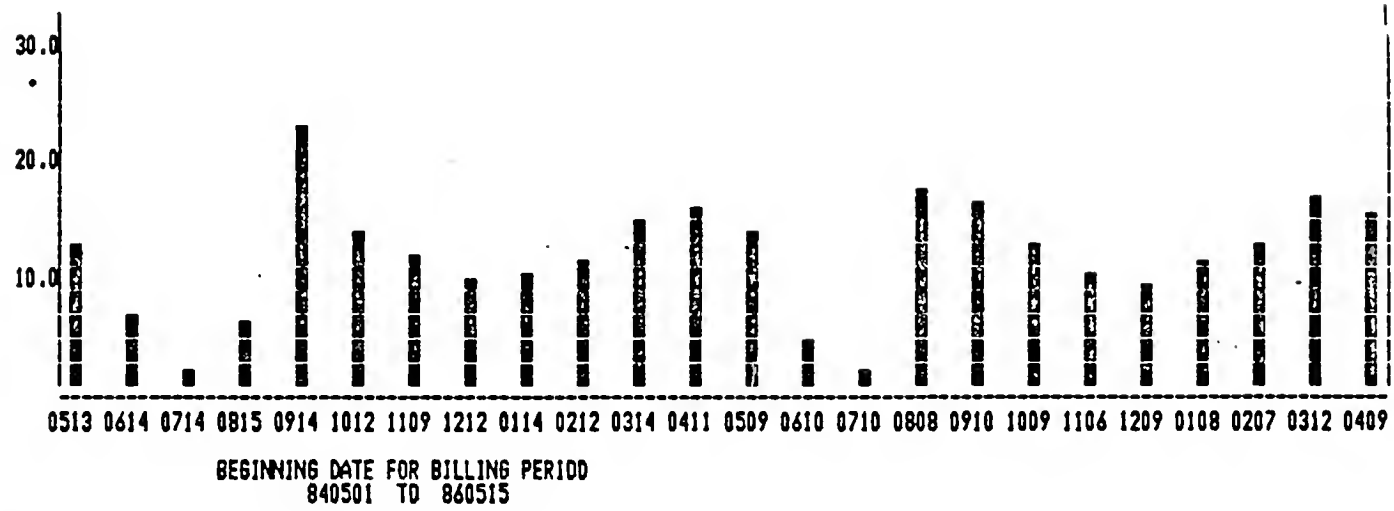


GAS COST PER MONTH



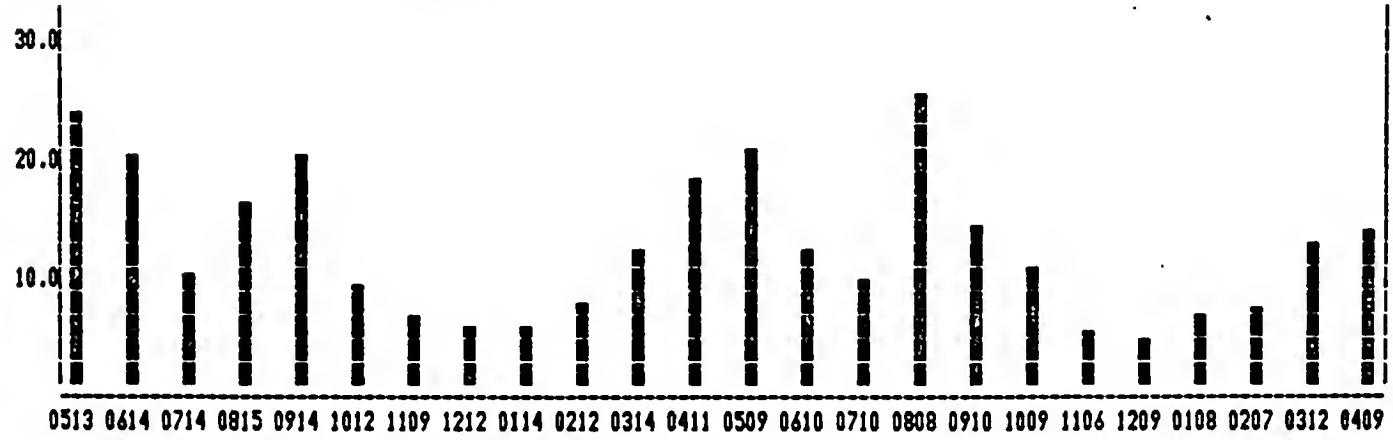
COUNTY COURTHOUSE
230 W. BROADWAY
MISSOULA MT 59802

GAS USE PER SQUARE FOOT PER DEGREE DAY (BTU'S)
(BALANCE TEMPERATURE - 55)
Total degree days



BEGINNING DATE FOR BILLING PERIOD
840501 TO 860515

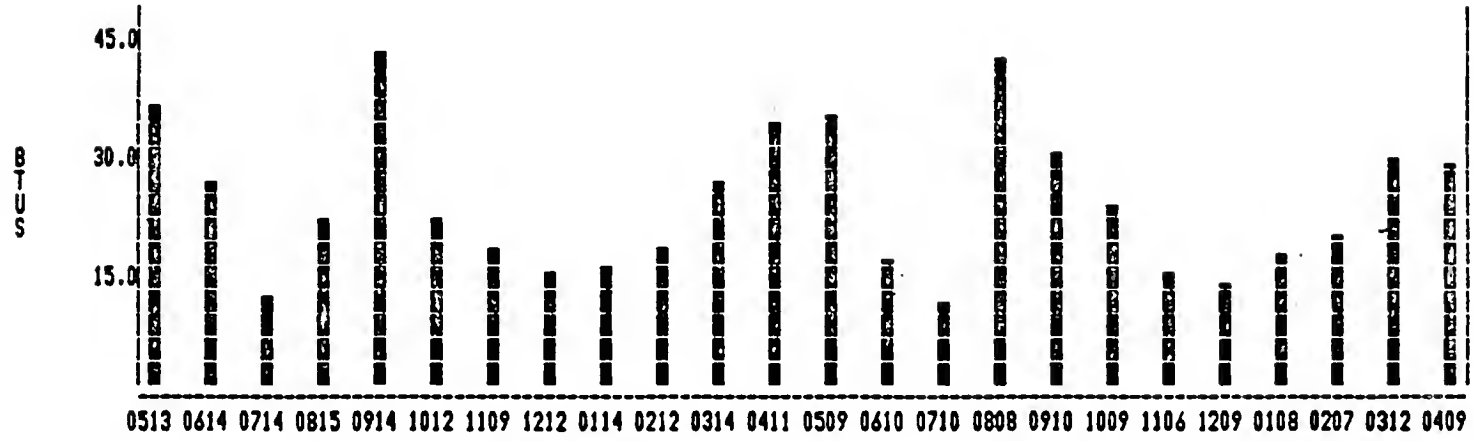
ELECTRIC USE PER SQUARE FOOT PER DEGREE DAY (BTU'S)
(BALANCE TEMPERATURE - 55)
Total degree days



BEGINNING DATE FOR BILLING PERIOD
840501 TO 860515

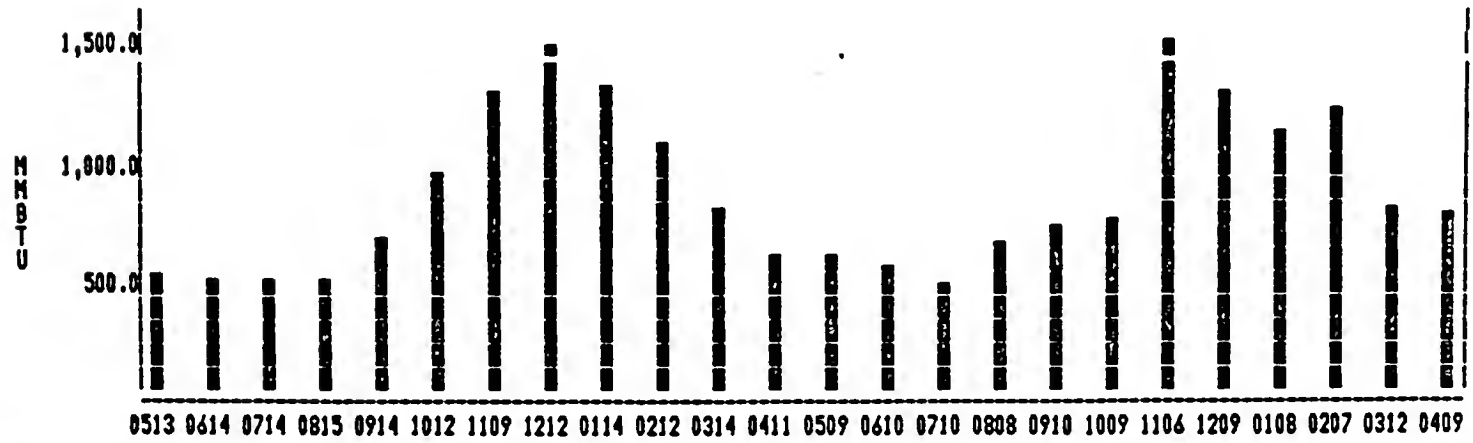
COUNTY COURTHOUSE
230 W. BROADWAY
MISSOULA MT 59802

ENERGY USE PER SQUARE FOOT PER DEGREE DAY (BTU'S)
(BALANCE TEMPERATURE - 55)
Total degree days



BEGINNING DATE FOR BILLING PERIOD
840501 TO 860515

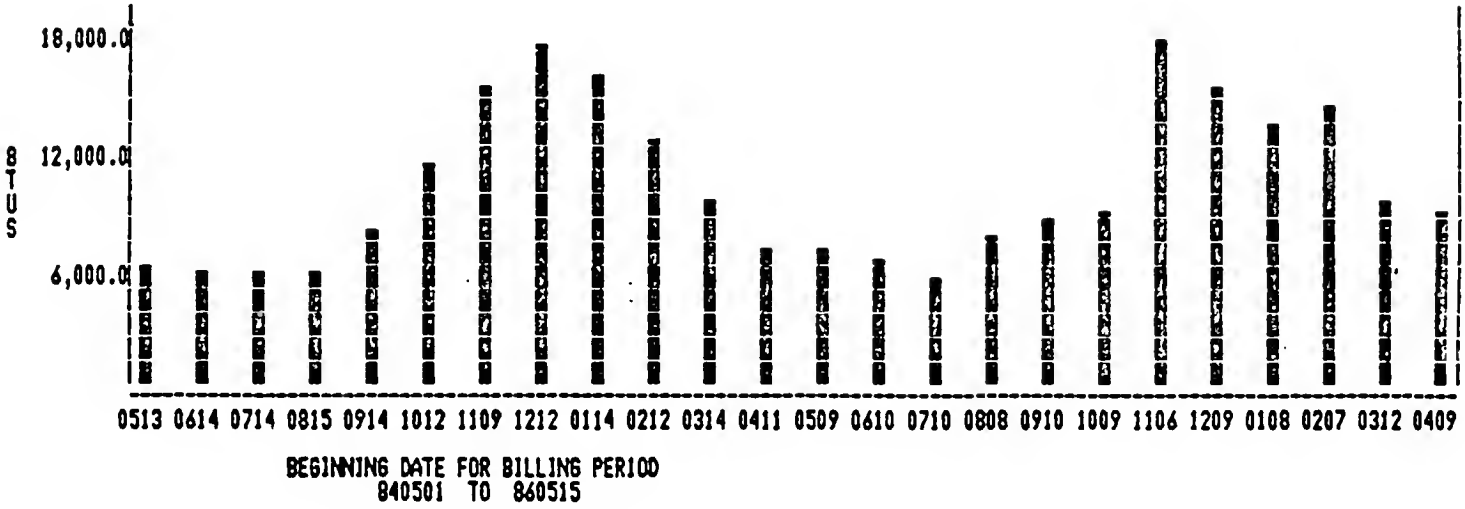
TOTAL ENERGY USE PER MONTH (MMBTU)



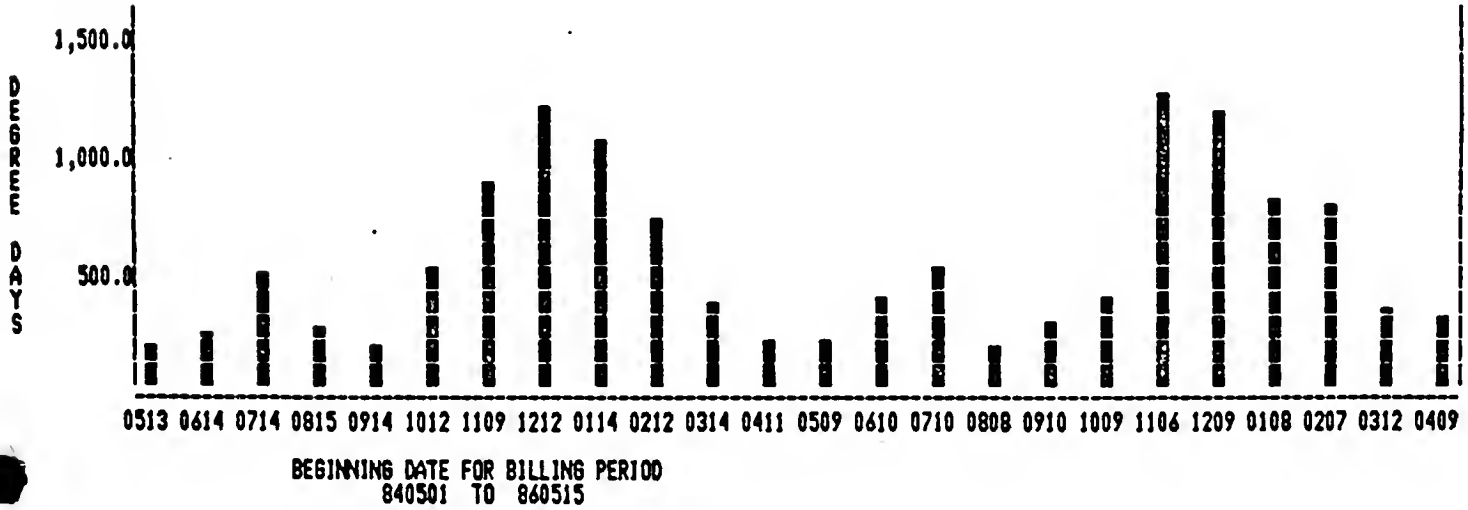
BEGINNING DATE FOR BILLING PERIOD
840501 TO 860515

COUNTY COURTHOUSE
230 W. BROADWAY
MISSOULA MT 59802

BTU'S PER SQUARE FOOT PER MONTH



TOTAL DEGREE DAYS PER MONTH (HEATING AND COOLING)



ACCOPRESS®

25071	BLACK
25072	LIGHT BLUE
25073	DARK BLUE
25074	LIGHT GRAY
25075	LIGHT GREEN
25076	DARK GREEN
25077	TANGERINE
25078	RED
25079	EXECUTIVE RED
25070	YELLOW

GENUINE PRESSBOARD

ACCO INTERNATIONAL INC.
CHICAGO, ILLINOIS 60618